City and County of Honolulu

1998 WASTEWATER SYSTEM REVENUE BONDS ENGINEER'S REPORT

Final

November 25, 1998

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CAROLLO engineers

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November 25, 1998
4635A.00 T01

City and County of Honolulu
Mr. Timothy Houghton
Department of Environmental Services
650 South King Street, 3rd Floor
Honolulu, HI 96813

PaineWebber Incorporated
Mr. Anthony H. Fisher
Managing Director
725 South Figueroa Street, 41st Floor
Los Angeles, CA 90017

Subject: Engineer's Report for the City and County of Honolulu
1998 Wastewater System Revenue Bonds

Gentlemen:

We have been retained to provide the enclosed Engineer's Report for inclusion in the Official Statement relating to the issuance of the 1998 Wastewater System Revenue Bonds, which are to fund a number of capital improvement projects for the wastewater systems and facilities of the Department of Environmental Services.

The scope of this report includes: 1) a review of the City and County's existing wastewater facilities and the need for the 1998 Senior Bonds; 2) a review of the need for wastewater facility improvements, and of the reasonableness of the cost estimates and construction schedules, and 3) a review of the Department of Environmental Services' financial projections, including the reasonableness of the assumptions, the adequacy of future revenues to cover operation and maintenance expenses, debt service, required coverage and future capital costs and contingencies.

We have reviewed the Official Statement to which this report is appended. In our opinion, the information represented therein, which is taken from this report, is accurately presented.

Very truly yours,

CAROLLO ENGINEERS, P.C.

H. Stephen McDonald
Principal

HSM:JPP:arc
Enclosure: Engineer's Report

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CITY AND COUNTY OF HONOLULU
DEPARTMENT OF ENVIRONMENTAL SERVICES

1998 WASTEWATER SYSTEM REVENUE BONDS
ENGINEER'S REPORT

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1.1 INTRODUCTION AND BACKGROUND

Overview of Existing Wastewater Facilities

The City and County of Honolulu's Department of Environmental Services ("Department") is responsible for the operation, maintenance, compliance monitoring, and fiscal planning and execution for the City's wastewater system.

The wastewater systems service approximately 125,000 separate accounts and a population of approximately 600,000 of the island's total population of 850,000. The customer base includes the residential population, businesses and industries, and other users located in the 500-square-mile service area. Out of 125,000 accounts, approximately 120,000 are residential and represent approximately 71 percent of the total revenue from sewer service charges. The remaining 5,000 are non-residential and represent approximately 29 percent of the total revenue from sewer service charges.

The island of Oahu, which constitutes the City and County of Honolulu, is divided into eight wastewater basins: Central Oahu, East Mamala Bay, Kailua/Kaneohe/Kahaluu, North Oahu (East), North Oahu (West), Waianae, Waimanalo, and West Mamala Bay. Each basin is served by a major wastewater treatment plant (WWTP). The basins and the associated WWTP's are shown in Figure ES-1 and listed in Table ES-1.

Table ES-1 Wastewater Drainage Basins and Major Facilities
City and County of Honolulu
Department of Environmental Services

Region	Basin	WWTP	Discharge Location
Metro	• East Mamala Bay	• Sand Island	• Ocean
Leeward	• West Mamala Bay	• Honouliuli	• Ocean
	• North Oahu (West)	• Pa'alaa Kai	• Injection Wells
	• Waianae	• Waianae	• Ocean
	• Central Oahu	• Wahiawa	• Reservoir
Windward	• Kailua/Kaneohe/Kahaluu	• Kailua Regional[1]	• Ocean
	• North Oahu (East)	• Kahuku	• Injection Wells
	• Waimanalo	• Waimanalo	• Injection Wells

Notes:
(1) Includes Ahuimanu and Kaneohe Wastewater Preliminary Treatment Facilities.
WWTP = Wastewater Treatment Plant

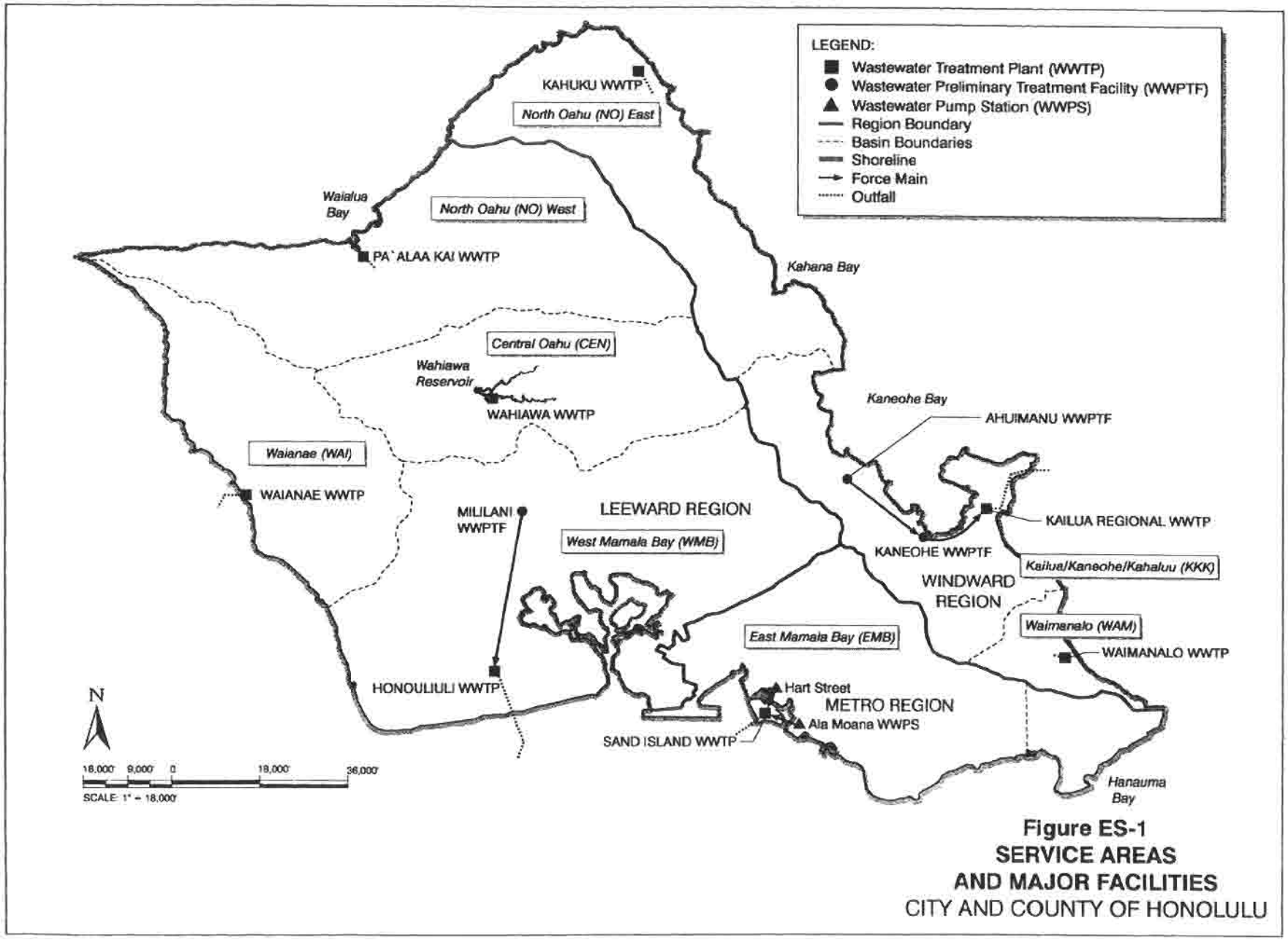

Figure ES-1
SERVICE AREAS
AND MAJOR FACILITIES
CITY AND COUNTY OF HONOLULU

Over 90 percent of the wastewater flows are treated by the three largest facilities: the Sand Island WWTP, which treats 70.5 million gallons per day (mgd) of average dry weather flow (ADWF) from Honolulu, the Honouliuli WWTP, which treats 25.8 mgd ADWF from the Pearl Harbor area, and the Kailua Regional WWTP, which treats 12.5 mgd ADWF from the eastern populated areas of the island.

Compliance with Discharge Requirements

Seven out of the eight WWTPs are owned by the City and County of Honolulu, and operated by the Department. These WWTPs currently meet national and state discharge requirements. The eighth WWTP, the Waimanalo WWTP, which accounted for only 0.5 percent of the total 1997 wastewater flow, is owned by the State of Hawaii and operated by the Department. The Waimanalo WWTP has not consistently met discharge requirements.

The community of Honolulu highly values a clean environment and has raised concerns about improving wastewater treatment at several of the City and County of Honolulu's wastewater treatment facilities. To address these concerns, the Department has worked with the community, the EPA, and the State of Hawaii Department of Health to develop several consent decrees. The consent decrees reflect agreed upon actions to meet the objectives of the City and County of Honolulu, the EPA, and other major participants for improvements to the existing wastewater systems. The consent decrees confirm the overall direction and schedule for the wastewater management program.

Organization of the City and County of Honolulu Wastewater Enterprise

The City and County of Honolulu's Department of Environmental Services is responsible for the operation, maintenance, compliance monitoring, and fiscal planning and execution for the City's wastewater system.

The Department is composed of nearly 630 employees in support of the wastewater program. The Office of Administrative Support provides fiscal control, personnel support, and Capital Improvement Plan ("CIP") program development activities. The Division of Wastewater Treatment and Disposal and the Division of Collection System Maintenance provide operation and maintenance of the treatment plants, pump stations, and the collection system. The Division of Environmental Quality provides performance monitoring, source control, and laboratory services. An additional 400 employees support the solid waste collection and disposal program.

The Department of Environmental Services was created July 1, 1998 as part of a City-wide reorganization to streamline operations. Previously, the Department of Wastewater Management, created by a City Charter change effective July 1, 1993, provided operation, maintenance, planning, design and construction of City wastewater facilities. Prior to that time, wastewater management was a division under the Department of Public Works.

Wastewater facility planning, design and construction activities have been consolidated in the City's Department of Design and Construction to better leverage the talents of the City-wide resources. Similarly, wastewater permitting has been consolidated in the City's Department of

Planning and Permitting to provide one-stop permitting service to customers and better relate approval of development plans with City-wide planning. These changes should positively benefit and improve the already quality wastewater program.

Capital Program Planning and Future Direction

The Department has developed a comprehensive long-term planning program for wastewater management which has led to the completion of facility plans and preliminary designs for most of the major wastewater facilities on the island. The facility plans for the individual WWTPs are incorporated in the 20-year CIP.

The Department retains the responsibility for insuring that appropriate planning for the future continues as the program is executed, modified and planned beyond the 20-year period.

Wastewater Flow Projections

The wastewater flow and strength projections are based on the anticipated growth rates included in the City and County of Honolulu's General Plan. Growth is not a significant factor in driving the overall need for 20-year CIP projects. Only 17 percent of the 20-year CIP costs are associated with projects that are required to accommodate growth.

1.2 1998-2002 CIP PROJECTS

Need for the 1998-2002 Projects

The 1998-2002 CIP projects fall into three general categories: collection system, wastewater treatment plant, and effluent reuse/disposal. The need for projects in each category is outlined below.

Collection System Improvement Projects

The collection system improvement projects are needed to replace or rehabilitate severely corroded pipe and to reduce major infiltration/inflow conditions. Replacement of severely corroded pipe will reduce infiltration/inflow during wet weather events, and will result in lower operation and maintenance costs for both the collection systems and associated WWTPs.

The Department has planned for the design or construction of 35 collection system improvement projects between fiscal years ending 1998-2002. The total expenditures for these projects through the year 2002 is approximately $163 million, with an expected $61 million to be expended within the first three years and approximately $102 million to be expended in the remaining two years.

Collection system improvement projects are the highest priority projects due to extremely deteriorated and corroded pipe conditions that have resulted in excessive infiltration, inflow, and overflows during wet weather conditions. These projects will help to reduce the use of cesspools, which contribute to potential public health concerns.

Wastewater Treatment Plant Improvement Projects

The WWTP improvement projects are needed to upgrade existing facilities to satisfy regulatory requirements, to improve the ability of the facilities to handle peak wet weather flows, and in some cases to accommodate growth. The Department has planned for the design and/or construction of 22 WWTP improvement projects totaling approximately $78 million between fiscal years ending 1998-2002. Projects between fiscal years ending 1998-2002 include the Sand Island WWTP Unit 1 Phase 2A Headworks Project, the Honouliuli WWTP 1A Solids Project, and the Kaneohe WWTP Modifications Phase 3 Project.

Effluent Reuse/Disposal Projects

The effluent reuse/disposal projects are needed to meet consent decree requirements to provide effluent reuse/disposal as a component of the overall community's water supply, and to meet development needs.

The Department has planned for the design and/or construction of 3 major effluent reuse/disposal projects during fiscal years ending 1998-2002, and total approximately $16 million. As discussed previously, effluent reuse projects are planned to meet consent decree requirements, to meet development requirements, and to improve the water quality of the Wahiawa Reservoir. The major effluent reuse projects are the Honouliuli Wastewater Treatment Plant Effluent Reuse Project, the Wahiawa Wastewater Treatment Plant Conversion and Reuse Project, and the potential Mililani Water Reuse Project.

Project Management

The Department uses a combination of professional engineering staff and specialty subcontractors to provide construction management services. The Department leverages in-house permanent staff by hiring outside project staff only on an as-needed basis for construction management activities.

Summary of Estimated Project Costs

The summary of costs for 1998-2002 CIP projects by project category is presented in Table ES-2. These costs include planning, design, and construction costs as well as all engineering, administrative, and legal expenses. As shown in Table ES-2, the City and County of Honolulu Wastewater System Revenue Bonds (First Bond Resolution), 1998 Senior Series (the "1998 Senior Bonds"), totaling approximately $50 million, will partially finance the 1998-2002 CIP projects, with the balance to be primarily met from existing funds of the Department, annual revenues, and from the proceeds of future revenue bond issues.

1.3 FUTURE PROJECTS

Long-Term Expansion and Rehabilitation Needs

A summary of the 20-year CIP total costs by project category is provided in Figure ES-2. Approximately 71 percent of the total project costs are associated with collection system improvements, 27 percent with WWTP improvements, and 2 percent with effluent reuse projects.

A summary of the 20-year CIP total cost by primary project purpose is presented in Figure ES-3. As shown in Figure ES-3, approximately 84 percent of the total costs are associated with non-discretionary projects that must be completed in order to satisfy consent decree, permit/regulatory, expansion, and safety/public health requirements. The remaining 16 percent of the total costs are associated with discretionary projects that have been identified to improve wastewater treatment and collection systems. The Department has identified these discretionary projects in order to address reliability, improvement, and preventive maintenance concerns.

Cost of CIP Projects

Estimated capital project costs for future facilities have been developed for each of the eight wastewater basins. The capital cost estimates include land acquisition, planning, design, construction, construction management, and all other costs required to deliver a completed project.

Timing of CIP Projects

An implementation schedule for the 20-year CIP projects has been developed, which includes the timing of major CIP projects necessary to accommodate increased wastewater flows and loadings due to anticipated growth, to meet consent decree scheduled activities, and for replacement and rehabilitation needs. Some of the 1998-2002 CIP projects are already funded through planning and design. Others will be funded from the proceeds of the 1998 Senior Bonds, the existing capital reserves, and future bond issues.

Growth Rate Considerations

The cost of projects that are required to accommodate growth is projected to be only 17 percent of the 20-year CIP total costs. Most of the projects in the CIP are driven by factors other than growth such as consent decree requirements, rehabilitation and replacement of existing aging infrastructure, and public safety.

Table ES-2 **Summary of Estimated CIP Project Expenditures, 1998-2002**
City and County of Honolulu Department of Environmental Services

Project	(Thousands of Dollars (1))						
	Fiscal Year					Total Expenditures	
	97/98	98/99	99/00	00/01	01/02	97/98 - 99/00	97/98 - 01/02
Expenditure Schedule							
Collection System Projects							
Consent Decree Projects	$75	$469	$551	$900	$1,269	$1,096	$3,265
Other Non-Discretionary Projects	1,285	14,739	32,359	29,853	27,088	48,383	105,324
Other Discretionary Projects	30	1,770	9,729	16,135	27,240	11,529	54,904
Subtotal : Collection System	$1,390	$16,978	$42,639	$46,888	$55,598	$61,007	$163,493
Treatment Plant Projects							
Consent Decree Projects	$90	$1,680	$6,240	$3,215	$110	$8,010	$11,335
Other Non-Discretionary Projects	0	30	2,228	12,368	22,684	2,258	37,310
Other Discretionary Projects	190	3,990	6,597	6,232	12,012	10,777	29,021
Subtotal : Treatment Plant	$280	$5,700	$15,065	$21,815	$34,807	$21,045	$77,666
Reuse Projects							
Consent Decree Projects	$0	$1,710	$3,675	$3,022	$2,434	$5,385	$10,841
Expansion Projects	0	100	290	1,076	3,662	390	5,128
Subtotal : Reuse	$0	$1,810	$3,965	$4,097	$6,096	$5,775	$15,968
Ongoing G.O. Bond Funded Projects	$36,230	$30,660	$14,830	$2,700	$0	$81,720	$84,420
Total CIP	$37,900	$55,148	$76,499	$75,500	$96,500	$169,548	$341,547
Anticipated Funding Sources for CIP Projects							
G.O. Bond Proceeds (previously issued)						$81,720	$84,420
SRF Loan Proceeds (new)						10,000	20,000
Sewer Facility Charges (connection fees)						5,174	8,876
Sewer Service Charges (pay as you go)						14,100	37,900
1998 Senior Series Revenue Bonds						50,000	50,000
Revenue Bonds (future)						30,000	165,000
Total Sources of Funds Available (2)						$190,994	$366,196

Notes:
(1) All costs are presented in inflated dollars, assuming 3% inflation per year, beginning in Fiscal Year 1999/00.
(2) Excess revenues available will be applied towards CIP project expenditures in future years.

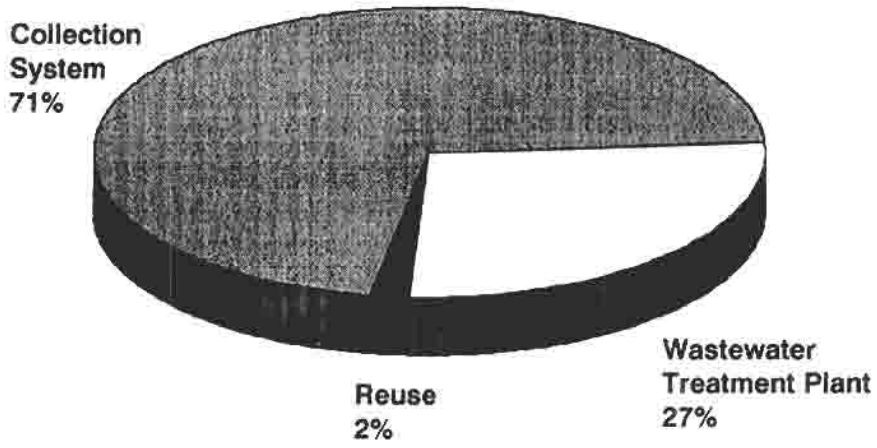

Figure ES-2
20-YEAR CIP BY PROJECT CATEGORY
CITY AND COUNTY OF HONOLULU

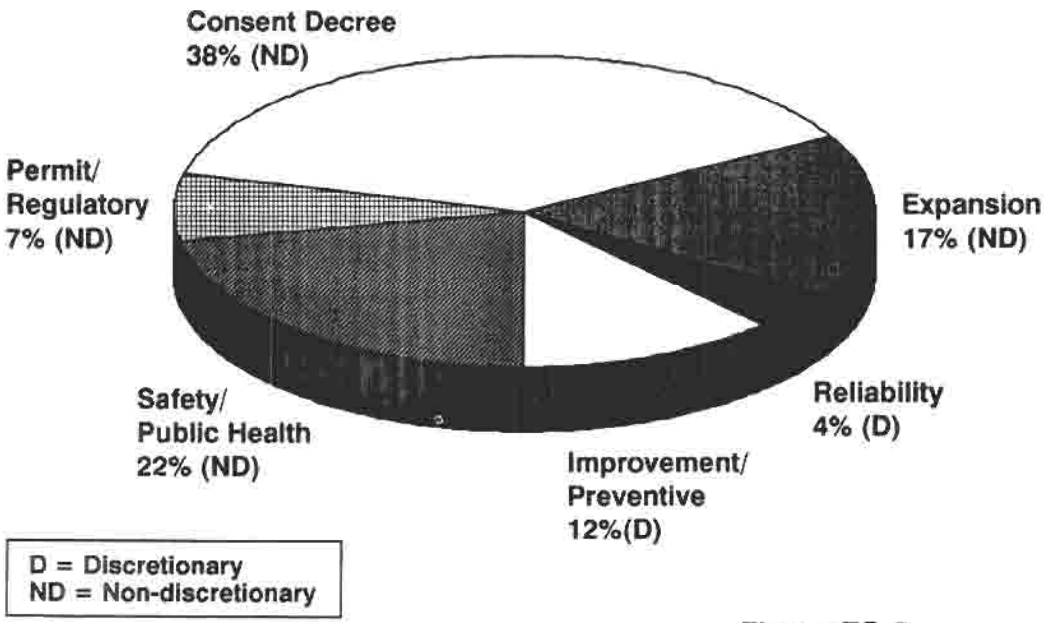

Figure ES-3
20-YEAR CIP BY PROJECT MAIN PURPOSE
CITY AND COUNTY OF HONOLULU

1.4 CURRENT AND FUTURE SEWER SERVICE AND SYSTEM FACILITY CHARGES

Sources and Uses of Funds

The Department's revenues are currently derived from three major sources: monthly sewer service charges, system facility charges, and interest earned on fund balances. Of these sources, sewer service charges provide the major source of revenue.

Existing Rates and Charges

The current sewer service charge for single-family residences is approximately $33.65 per month. Sewer service charges have been held constant since September 1, 1993. New connections have averaged approximately 2,500 equivalent single-family dwelling units (ESDU) per year over the past five years. System facility charges have been held constant at $1,146 per ESDU since 1991-1992.

Projected Rates and Charges

Sewer service charges and system facility charges are projected to increase beginning in fiscal year ending 1999-2000 to accommodate the needs of the capital improvement program.

1.5 SUMMARY OF PROJECTED REVENUES AND EXPENSES

A ten-year projection through fiscal year ending 2006-2007 for the Department's operations has been prepared and is presented in Table ES-3. As shown in Table ES-3, sewer service charges are projected to continue to be the major source of revenues to cover debt service.

The City Council has adopted a set of Debt and Financial Policies for its wastewater system that target, among other things, the City to maintain a 1.60 times coverage for its Senior Revenue Bonds and 1.25 times coverage for all Revenue Bonds (Senior and Junior). It is expected that the City will adopt annual increases in sewer services charges necessary to meet the debt service coverage requirements prescribed in its Debt and Financial Policies. Current projections show that the debt service coverage requirements will be achieved by: 1) increasing sewer service charges between 3.0 and 5.4 percent annually beginning in fiscal year ending 1999/2000, and 2) increasing system facility charges 3.0 percent annually beginning in fiscal year ending 1999/2000.

1.6 CONCLUSIONS

Based upon our studies, the assumptions discussed in this report, and our review of the data and analysis provided by the City and County of Honolulu and its consultants, we conclude the following:

Table ES-3 Projected Cash Flow Summary
City and County of Honolulu Department of Environmental Services

(Revenue and Expense Numbers in Millions)	(FY Ending June 30)										
Fiscal Year	**1998 (7)**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**TOTAL**
Growth Assumptions											
Total ESDUs at Start of Year	275,691	277,351	278,661	280,161	281,661	283,161	284,661	286,161	287,661	289,161	
Total New ESDUs Added	1,660	1,310	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	14,970
Revenues											
Sewer Service Charges	111.5	111.5	116.2	120.3	125.6	131.0	137.8	144.9	153.5	162.6	1,315.0
System Facility Charges (SFC)	1.9	1.5	1.8	1.8	1.9	1.9	2.0	2.1	2.1	2.2	19.1
Interest on Unrestricted Reserves (1)	0.0	2.5	2.8	2.5	2.9	3.0	3.0	2.8	2.5	2.3	24.3
Other Revenues (2)	1.6	0.9	1.0	1.1	1.1	1.2	1.3	1.3	1.4	1.5	12.3
TOTAL REVENUES	115.0	116.4	121.8	125.7	131.5	137.2	144.0	151.1	159.6	168.6	1,370.8
Expenses											
O&M Costs (3)	74.1	68.6	71.5	73.7	76.0	78.3	80.8	83.4	86.0	88.8	781.1
TOTAL EXPENSES	74.1	68.6	71.5	73.7	76.0	78.3	80.8	83.4	86.0	88.8	781.1
TOTAL NET REVENUES	40.9	47.9	50.3	52.0	55.5	58.9	63.2	67.7	73.6	79.8	589.7
Debt Service											
Sr. Revenue Bond Debt Service (4)	0.0	0.0	3.2	5.3	10.1	15.2	20.8	27.0	33.3	39.6	154.6
Jr. Revenue Bond Debt Service (4)(5)	0.0	0.0	10.7	10.2	10.2	10.2	10.2	10.2	10.2	10.2	82.1
Reimbursable G.O. Debt Service (6)	34.3	19.4	12.6	12.5	12.8	13.1	13.0	12.4	11.9	11.6	153.5
SRF Loans (Existing and Future)	4.5	5.1	5.2	5.6	5.9	6.3	6.7	7.0	7.4	7.8	61.4
Total Debt Service	38.8	24.4	31.6	33.6	39.0	44.8	50.7	56.7	62.7	69.1	451.6
TOTAL NET REVENUES AVAILABLE FOR OTHER REQUIREMENTS	2.1	23.5	18.7	18.4	16.5	14.1	12.5	10.9	10.8	10.6	138.1
Sr. Revenue Bond Coverage Ratio (8)	-	-	15.11	9.38	5.33	3.74	2.94	2.43	2.15	1.96	
Total Revenue Bond Coverage Ratio	-	-	3.50	3.22	2.65	2.24	1.97	1.76	1.64	1.56	
Fixed Charge Coverage Ratio:	-	1.90	1.53	1.49	1.38	1.27	1.21	1.16	1.14	1.12	
Capital Project Financing											
Capital Expenditures	37.9	55.1	76.5	75.5	96.5	112.1	114.5	112.5	112.2	109.8	902.5
SRF Loan Proceeds	0.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	45.0
Net Revenue Bond Proceeds	0.0	50.0	30.0	50.0	85.0	85.0	90.0	90.0	90.0	90.0	660.0
Major Reserves (end of year)											
Unrestricted Reserve Balance	42.1	56.8	49.0	58.6	60.1	59.2	55.8	50.8	45.7	40.5	
G.O. Bond Proceeds Fund	47.8	17.1	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Improvement Account Excess/(Shortfall)	-1.7	37.6	18.1	9.6	18.7	12.5	9.5	8.4	7.6	9.1	
Total Ending Balance	88.2	111.5	69.5	68.2	78.8	71.7	65.3	59.2	53.3	49.5	
Projected Charges Required											
Monthly Sewer Service Charge (5)	$33.65	$33.65	$34.66	$35.70	$37.06	$38.46	$40.23	$42.08	$44.36	$46.75	
Increase Over Prior Year	0.0%	0.0%	3.0%	3.0%	3.8%	3.8%	4.6%	4.6%	5.4%	5.4%	
System Facility Charge (5)	$1,146	$1,146	$1,180	$1,216	$1,252	$1,290	$1,329	$1,368	$1,409	$1,452	
Increase Over Prior Year	0.0%	0.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	

notes:
(1) Unrestricted Reserves are all reserves except Revenue Bond Improvement Account and G.O. Bond balance. Interest on G.O. Bond balance remains in City General Fund.
(2) Includes cesspool services, connections, laterals, and other miscellaneous revenues.
(3) Note that FYE 98 O&M expenses include one-time only $3.8 million reimbursement to City General Fund.
(4) Assumes December 1998 issues of Revenue Bonds, with interest payments beginning in FY 99/00.
(5) Junior Series 1998 proceeds used to advance refund approximately $220 million of reimbursable G.O. Bonds.
(6) Debt service on reimbursable G.O. Bonds is paid from the City's General Fund. However, reimbursement to the General Fund is required for these payments from sewer service charges.
(7) Values for FYE 1998 are projected actual, but unaudited.
(8) Revenues for coverage calculations do not include system facility charges.
FYE = Fiscal Year Ending

Compliance with Discharge Requirements

Except for periodic events at the State-owned Waimanalo WWTP, which accounts for only 0.5 percent of total 1997 flow, the wastewater treatment facilities are meeting current regulatory requirements and are operated and maintained in accordance with standard utility practices.

The City and County of Honolulu's Wastewater System collection and pumping facilities do not meet all of the current and anticipated federal and state regulatory requirements, and will require additional capacity necessary to serve the projected growth in the service area. These collection and pumping facilities constitute much of the need for capital facility improvements.

Completion of the CIP projects described in this report will permit the City and County of Honolulu to attain and to remain in compliance with all federal, state, and local regulations regarding treatment and discharge as described in the current NPDES permit and consent decrees.

20-Year CIP

An estimated $1.4 billion of non-discretionary CIP projects for various treatment, collection and other facilities are required to be constructed over the next 20 years to eliminate the current and projected critical deficiencies, to meet consent decree milestones, and to provide a wastewater system in a satisfactory operating condition based on projected wastewater usage and environmental and other regulatory requirements. The remaining approximately $0.3 billion of CIP projects are discretionary and have been identified to improve wastewater treatment and collection systems. These CIP projects are to be funded from proceeds of bonds, including the 1998 Wastewater Revenue Bonds and from net revenues and other charges.

The $1.7 billion CIP is technically sound and conforms with good engineering practice and the estimated total costs of the CIP have been realistically assessed.

The cost-effectiveness of the wastewater system operations and maintenance activities is anticipated to improve after the CIP projects are accomplished.

1998-2002 CIP Projects

The projects to be financed by the 1998 Senior Bonds are the highest priority projects required to meet consent decree requirements and protect public health. They are included in recently completed facility plans, which identify the need for projects through the year 2017, and provide the most cost effective facilities evaluated in those plans.

The estimated project costs and construction schedules that have been developed for the 1998-2002 projects are reasonable and achievable.

Department Management

The operations of the wastewater system are directed by a professional staff for the disciplines of operations specialists, maintenance (including electrical, instrumentation and mechanical), laboratory personnel and other technical support personnel.

Financial Projections

The financial projections with respect to the wastewater system are based on reasonable and conservative assumptions and should fairly reflect the financial performance of the wastewater system.

Historical, current, and projected customer rates and charges for the City and County of Honolulu are relatively high compared to the rates and charges of other agencies, but are reasonable considering a number of site specific factors.

In the opinion of Carollo Engineers, projected sewer service and system facility charges will provide revenue sufficient to:

- Meet all projected costs of operation, maintenance and routine replacement of sewer system facilities.
- Meet the existing debt service obligations and the projected requirements for the 1998 Senior Bonds, the City and County of Honolulu Wastewater System Revenue Bonds (Second Bond Resolution), Junior Series 1998 (the "1998 Junior Bonds") and future bond issues.
- Provide sufficient revenue to pay the costs of the City and County of Honolulu's CIP through the end of the forecast period.
- Meet reserve requirements of bond resolution.

The funds obtained from the sale of the 1998 Senior Bonds, current cash reserves, fees collected over the next few years, and future bond issues will be adequate to fund the current projects. The funds obtained from the sale of the 1998 Junior Bonds will be used to refund certain reimbursable General Obligation bonds of the City and County issued to finance previously identified projects for the wastewater system.

The rate at which growth occurs will not affect the ability of the City and County of Honolulu to meet its debt obligations because the growth is a small component of the overall costs and revenues associated with the financial projections. In general, many of the CIP projects are necessary and must proceed based on consent decree requirements and public safety and health concerns with or without any additional connections.

This report has been prepared at the request of the City and County of Honolulu for appending to the Official Statements relating to the issuance of the 1998 Senior Bonds and the 1998 Junior Bonds. The conclusions, observations, and recommendations contained herein constitute only the

opinions of Carollo Engineers. The various background documents, statements and other information supplied by the City and County of Honolulu, its employees, and other consultants have been relied upon as being accurate in the performance of these analyses. However, no assurances are given nor warranties implied by Carollo as to the accuracy of such information. Carollo makes no certification and gives no assurances except as explicitly set forth in this report.

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Chapter 2

INTRODUCTION AND BACKGROUND

This report has been prepared in support of the Official Statements prepared for the issuance of approximately $50,000,000 in principal amount of 1998 Senior Bonds and approximately $250,000,000 of 1998 Junior Bonds. Proceeds from the Wastewater System Revenue Bonds, 1998 Senior Series, will be used to fund the design and construction of a number of capital improvement projects throughout the City and County of Honolulu's wastewater system. Net funding available for projects is anticipated to be approximately $50 million. The capital improvement projects are part of an overall, comprehensive Capital Improvement Plan (CIP) spanning approximately 20 years through the year 2017.

Proceeds from the Wastewater System Revenue Bonds, Junior Series 1998 will be used to refund approximately $220 million of reimbursable G.O. Bonds of the City. The refunding of certain Reimbursable G.O. Bonds will allow the City to achieve a more level, overall debt service profile for its existing debt. The resulting debt structure will also allow the City to match more closely the average life of its existing debt with the useful life of the previously financed wastewater projects.

2.1 SCOPE OF REPORT

The scope of this report includes:

- A brief history of the City and County of Honolulu's Wastewater Facilities, the adequacy and condition of the existing facilities, and a summary of the major planning activities that have recently been completed.
- A description of the program and projects to be funded with the 1998 Wastewater System Revenue Bonds, Senior Series 1998 and the associated costs and implementation schedules.
- A summary of the timing and costs of ongoing and future projects as developed for the City and County of Honolulu's wastewater management system.
- A description of the wastewater sewer service charges and system facility charges over the forecast period.
- A summary of projected revenues and expenditures over the forecast period.
- The opinions of Carollo Engineers as to 1) the adequacy and condition of the existing facilities and the need for the 1998-2002 CIP Projects; 2) the reasonableness of the capital improvement program project cost estimates and schedules; 3) the reasonableness of the assumptions for the financial projections; 4) the adequacy and competitiveness of the City

and County of Honolulu's wastewater rate structure, and the adequacy of future revenues to cover operation and maintenance costs, expenses, debt service, coverage, future capital costs, and contingencies.

2.2 ENGINEER'S QUALIFICATIONS

Carollo Engineers, P.C. (Carollo) in association with R.M. Towill Corporation (RMTC) was selected to prepare this report as a result of their familiarity and knowledge of the City and County of Honolulu's wastewater treatment and conveyance facilities and operation and maintenance practices. Carollo Engineers was responsible for the overall report and financial analysis, while RMTC was responsible for analysis of treatment plant flows, performance and evaluation of treatment plant needs.

Carollo Engineers is a professional services engineering firm specializing in water and wastewater environmental engineering with 15 main offices and several project offices throughout the west. These offices are located in Walnut Creek, Sacramento, Fresno, Bakersfield, Santa Ana, San Diego, San Jose, and San Bernardino, California; Phoenix, Arizona; Salt Lake City, Utah; Las Vegas, Nevada; Portland, Oregon; El Paso, Texas; Boise, Idaho; and Milwaukee, Wisconsin. Since its founding in 1933, Carollo has successfully completed more than 6,000 water, wastewater, energy, solid waste, storm drain, and other related infrastructure projects for public agencies, governmental agencies, and industry. Carollo is currently ranked number 148 in the top 500 engineering firms in the United States by Engineering News Record.

Carollo has a total staff of over 400 professional employees including registered engineers in such disciplines as civil, structural, environmental, mechanical, chemical, sanitary, and corrosion engineering along with architects, planners, hydrologists and specialists in other areas. Subconsultants are retained as needed in specialized fields.

Carollo is familiar with the City and County of Honolulu's wastewater facilities and has completed several projects for the City and County of Honolulu in conjunction with RMTC, including Sand Island Wastewater Treatment Plant Modifications, Sand Island Wastewater Treatment Plant Predesign, Honolulu Spill Prevention Plan, Department of Defense (DOD) Central Oahu Water Quality Study, and the Central Oahu Wastewater Planning Study. Carollo Engineers has developed award-winning master plans for major wastewater facilities in the west in recent years, including the development of the Sacramento Regional Wastewater Treatment Plant (SRWTP) Master Plan in 1992. This Master Plan was awarded the American Academy of Environmental Engineers (AAEE) 1993 Excellence Honor Award, and the 1992 California Water Environment Association (CWEA) Engineering Achievement Award. Carollo has also completed master planning for $6.4 billion in new wastewater facilities in the last five years for major wastewater agencies including the County Sanitation Districts of Orange County, Reno-Sparks Washoe County Nevada, the City of Fresno, California, and several other wastewater agencies.

R.M. Towill Corporation began and has been in operation in Hawaii since 1930 and was incorporated in 1954. RMTC is very familiar with the City and County of Honolulu's wastewater treatment and conveyance systems. Major areas of services performed by the firm include:

- Environmental Engineering
- Civil Engineering
- Surveying and Photogrammetry
- Planning
- Construction Management

RMTC's portfolio of environmental engineering work accelerated in the 1970s coinciding with the passage of the Clean Water Act. Two major projects in recent years illustrate their qualifications and knowledge especially of wastewater systems located on Oahu. The City and County of Honolulu's "Spill Prevention/Spill Containment" project required RMTC to assess and develop spill reduction recommendations for all of the City's WWTP's and pump stations and recommend programs for management of the collection system. The Corps of Engineers "Wastewater Planning Study, Oahu, Hawaii" required RMTC to assess the future of all military facilities on the Island of Oahu including potential synergistic relations with the City and other non-military entities.

In addition to the above projects, RMTC has done major design work on many of the City and County's WWTP's and pump stations including current work on their largest facility, the Sand Island WWTP.

2.3 OVERVIEW OF THE DEPARTMENT OF ENVIRONMENTAL SERVICES

The City and County of Honolulu's Department of Environmental Services is responsible for the operation, maintenance, compliance monitoring and fiscal planning and execution for the City's wastewater system.

The Department is composed of nearly 630 employees in support of the wastewater program. The Office of Administrative Support provides fiscal control, personnel support and Capital Improvement Plan (CIP) program development activities. The Division of Wastewater Treatment and Disposal and the Division of Collection System Maintenance provide operation and maintenance of the treatment plants, pump stations and the collection system. The Division of Environmental Quality provides performance monitoring, source control and laboratory services. An additional 400 employees support the solid waste collection and disposal program. The Department consists of four divisions and an Office of Administrative Support as presented in Table 1.

Table 1 Listing of Divisions of the Department of Environmental Services City and County of Honolulu Department of Environmental Services	
Division	**Responsibility**
Wastewater Treatment and Disposal	Operation of Wastewater Treatment Plants and Pump Stations
Collection System Maintenance	Maintenance of Collection System Sewer Lines
Environmental Quality	Pretreatment Program, WWTP Permit Compliance, Storm Water Permit Compliance
Refuse Collection and Disposal	Collection and Disposal of Solids Waste
Office of Administrative Support	Fiscal Control, Personnel Support, and Capital Improvement Plan (CIP) Program Development

The Department of Environmental Services was created July 1, 1998 as part of a City-wide reorganization to streamline operations. Previously, the Department of Wastewater Management created by a City Charter change effective July 1, 1993, provided operation, maintenance, planning, design and construction of City wastewater facilities. Prior to that time, wastewater management was a division under the Department of Public Works.

Wastewater facility planning, design and construction activities have been consolidated in the City's Department of Design and Construction to better leverage the talents of the City-wide resources. Similarly, wastewater permitting has been consolidated in the City's Department of Planning and Permitting to provide one-stop permitting service to customer and better relate approval of development plans with City-wide planning. These changes should positively benefit and improve the already quality wastewater program.

In recent years, the Department has received national recognition for excellence, including the following awards:

- 1986 Operation and Maintenance Excellence Award – USEPA
  - Maunawili Park WWTP (plant no longer in existence)
  - Pa'alaa Kai WWTP
- 1993 Gold Award – Association of Metropolitan Sewerage Agencies
  - Wahiawa WWTP
  - NPDES Permit Compliance for Honouliuli WWTP
- 1995 Gold Award – Association of Metropolitan Sewerage Agencies
  - Wahiawa WWTP
- AMSA Gold Award for 1993, 1994, 1995, 1996
  - Kahuku WWTP

- 1996 Gold Award – Association of Metropolitan Sewerage Agencies
  - Waianae WWTP
- 1997 Gold Award – Association of Metropolitan Sewerage Agencies
  - Waianae WWTP
  - Wahiawa WWTP
  - Kailua Regional WWTP
  - Honouliuli WWTP
- AMSA Platinum Award for 1997
  - Kahuku WWTP
- EPA 1998 First-Place Award for exceptional operations and maintenance, Small Non-Discharging Facility
  - Kahuku WWTP

The Department uses a combination of professional engineering staff and specialty subcontractors to provide construction management services. The Department leverages in-house permanent staff by hiring outside project staff only on an as-needed basis for construction management activities. During construction, detailed up-to-date critical path method (CPM) project schedules are maintained. The professional staff provide overall project management and onsite construction inspection.

The City and County of Honolulu provides project management training sessions for staff engineers who are involved in construction management. The purpose of these sessions is to enhance project management skills for engineers and managers administering capital projects.

2.4 OVERVIEW OF EXISTING WASTEWATER FACILITIES

The wastewater systems service approximately 125,000 separate accounts and a population of approximately 600,000 of the Island's total population of 850,000. The customer base includes the residential population, businesses and industries, and other users located in the 500-square-mile service area. Out of 125,000 accounts, 120,000 are residential and represent approximately 71 percent of the total revenue from sewer service charges. The remaining 5,000 are non-residential and represent approximately 29 percent of the total revenue from sewer service charges.

General Description of Existing System

The island of Oahu, which constitutes the City and County of Honolulu, is divided into eight wastewater basins: Central Oahu, East Mamala Bay, Kailua/Kaneohe/Kahaluu, North Oahu (East), North Oahu (West), Waianae, Waimanalo, and West Mamala Bay. Each basin is served by a major WWTP. The basins and the associated WWTP's are shown in Figure 1 and listed in Table 2.

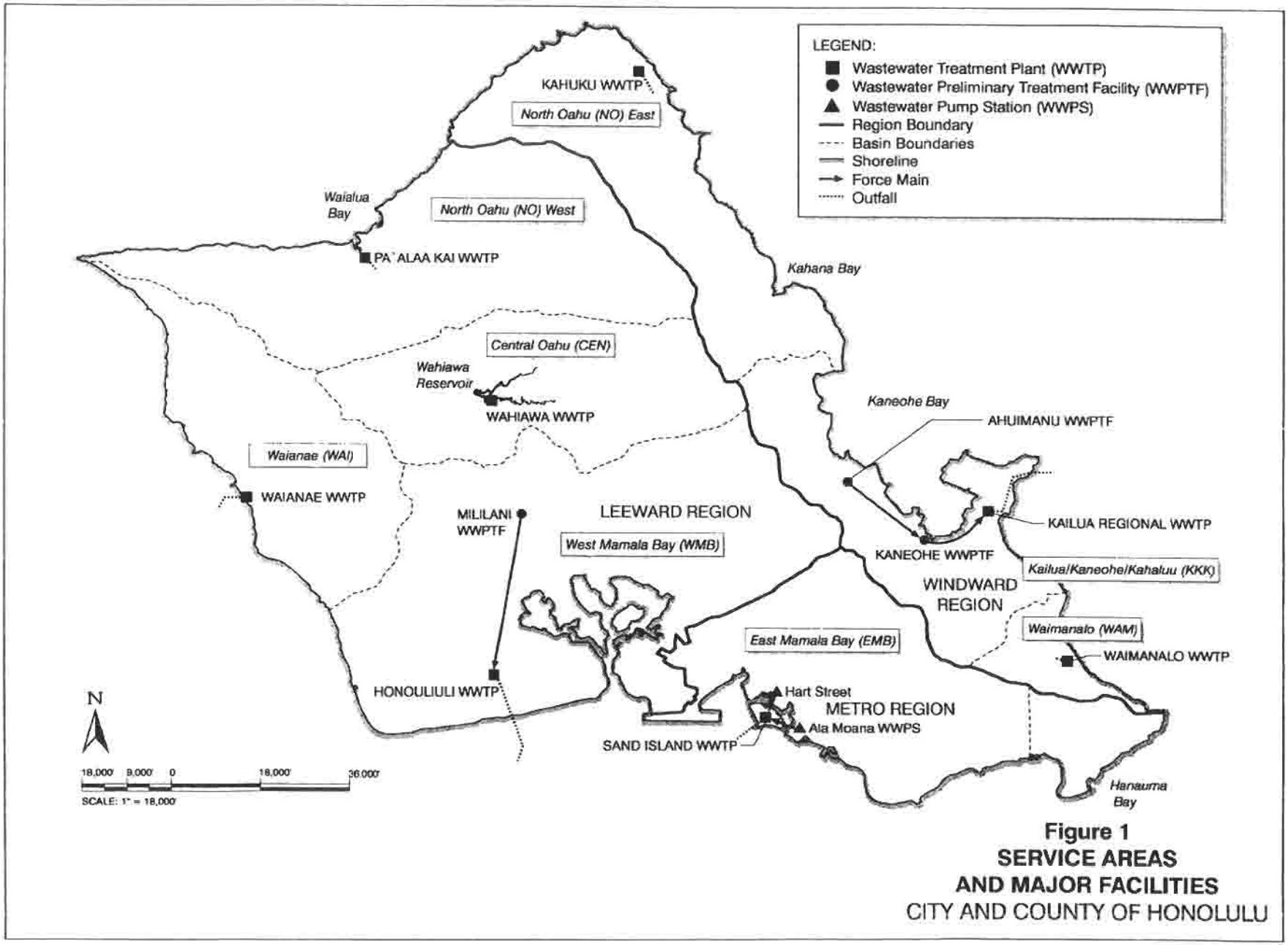


Figure 1
SERVICE AREAS
AND MAJOR FACILITIES
CITY AND COUNTY OF HONOLULU

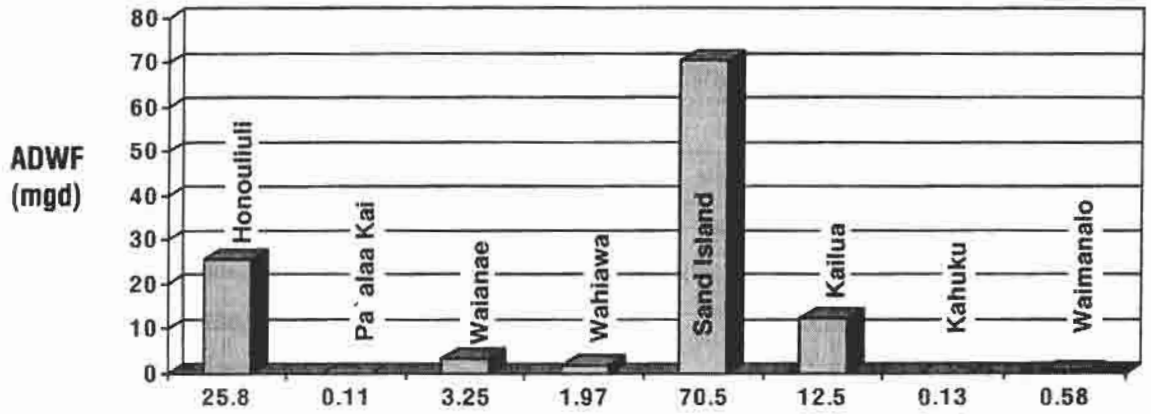
Table 2 Wastewater Drainage Basins and Major Facilities City and County of Honolulu Department of Environmental Services			
Region	**Basin**	**WWTP**	**Discharge Location**
Metro	• East Mamala Bay	• Sand Island	• Ocean
Leeward	• West Mamala Bay	• Honouliuli	• Ocean
	• North Oahu (West)	• Pa'alaa Kai	• Injection Wells
	• Waianae	• Waianae	• Ocean
	• Central Oahu	• Wahiawa	• Reservoir
Windward	• Kailua/Kaneohe/Kahaluu	• Kailua Regional[1]	• Ocean
	• North Oahu (East)	• Kahuku	• Injection Wells
	• Waimanalo	• Waimanalo	• Injection Wells

Notes:
(1) Includes Ahuimanu and Kaneohe Wastewater Preliminary Treatment Facilities.

Over 90 percent of the wastewater flows are treated by the three largest facilities: the Sand Island WWTP, which treats 70.5 million gallons per day (mgd) of average dry weather flow (ADWF) from Honolulu, the Honouliuli WWTP, which treats 25.8 mgd ADWF from the Pearl Harbor area, and the Kailua Regional WWTP, which treats 12.5 mgd ADWF from the eastern populated areas of the island. Flows for each wastewater facility are presented in Figure 2 and summarized in Table 3. Descriptions of the wastewater basins and major facilities are provided below.

Table 3 Wastewater Flows by Treatment Facility[1] City and County of Honolulu Department of Environmental Services			
Treatment Facility	**Design Capacity (mgd)**	**1997 Flow (mgd)**	**Projected 2020 Flow (mgd)**
Sand Island WWTP	82	70.5	92.6
Honouliuli WWTP	38	25.8	34.7
Pa'alaa Kai WWTP	0.14	0.11	0.11
Waianae WWTP	5.2	3.25	5.2
Wahiawa WWTP	2.5	1.97	2.0
Kailua Regional WWTP	15.25	12.5	12.8
Kahuku WWTP	0.4	0.13	0.38
Waimanalo WWTP	0.7	0.58	1.1
Total	144.19	114.8	148.9

Notes:
(1) Average dry weather flow, millions of gallons per day.



Total = 115 mgd

ADWF = Average Dry Weather Flow

Figure 2
SUMMARY OF EXISTING WASTEWATER TREATMENT FACILITIES AND FLOWS
CITY AND COUNTY OF HONOLULU

East Mamala Bay. The largest and most densely-populated wastewater basin has a population of approximately 374,000 and is served by the Sand Island WWTP. Built in the 1970's, the Sand Island WWTP currently treats 70.5 mgd of wastewater flow and has a primary treatment capacity of 82 mgd. The wastewater facility serves the City of Honolulu and surrounding areas.

West Mamala Bay. The second largest basin has a population of approximately 245,000 and is served by the Honouliuli WWTP. Built in 1981, the Honouliuli WWTP currently treats 25.8 mgd of wastewater flow and has a primary treatment capacity of 38 mgd. A secondary treatment capacity of 13 mgd was added in 1997. The wastewater facility serves Ewa, Central Oahu as far north as Mililani, and the Halawa to Pearl City area of the Primary Urban Center.

Kailua/Kaneohe/Kahaluu. The third largest basin has a population of approximately 110,000 and is served by the Kailua Regional WWTP, which serves the communities of Kailua, Kaneohe, Kahaluu, and surrounding areas. The Kailua Regional WWTP was built in the 1950's and was upgraded to secondary treatment in 1995. It currently treats 12 mgd of wastewater flow and has a secondary treatment capacity of 15.25 mgd.

North Oahu (East). The North Oahu (East) basin is largely unsewered and is served by the Kahuku WWTP. Built in the early 1980's, the Kahuku WWTP currently treats 0.13 mgd of wastewater flow and has a secondary treatment capacity of 0.4 mgd.

North Oahu (West). The North Oahu (West) basin is also largely unsewered and is served by the Pa'alaa Kai WWTP. Built in the mid-1980s, the Pa'alaa Kai WWTP currently treats 0.11 mgd of wastewater flow and has a secondary treatment capacity of 0.14 mgd.

The North Oahu (East) and North Oahu (West) basins have a combined population of approximately 19,000.

Waianae. The Waianae basin has a population of approximately 39,000 and is served by the Waianae WWTP. The Waianae WWTP was built in the 1960s and was upgraded to secondary treatment in 1995. It currently treats 3.25 mgd of wastewater flow and has a secondary capacity of 5.2 mgd.

Central Oahu. The Central Oahu basin has a population of approximately 44,000 and is served by the Wahiawa WWTP. Built in the 1950's, the Wahiawa WWTP currently treats 1.97 mgd of wastewater flow and has a secondary treatment capacity of 2.5 mgd. It serves the communities of Wahiawa and Whitmore Village.

Waimanalo. The Waimanalo basin has a population of approximately 9,000 and is served by the Waimanalo WWTP. Built in the 1970's, the Waimanalo WWTP currently treats 0.58 mgd of wastewater flow and has a secondary treatment capacity of 0.70 mgd.

Although the Central Oahu, North Oahu (East), North Oahu (West), Waianae, and Waimanalo basins comprise the majority of the geographical area of the island, the population density is much lower in comparison to the East and West Mamala Bay and the Kailua/Kaneohe/Kahaluu basin

areas. The combined population of the four basin areas is approximately 100,000, which is slightly less than 12 percent of the total population of Oahu. The total design capacity of the WWTP's in these four basin areas is nearly 9 mgd and the current wastewater flow is approximately 6 mgd.

2.5 COMPLIANCE WITH DISCHARGE REQUIREMENTS AND CONSENT DECREES

The WWTP's operated by City and County of Honolulu are governed by either a National Pollutant Discharge Elimination System (NPDES) Permit, or a State Department of Health Underground Injection Control Permit.

Seven out of eight WWTPs are owned by the City and County of Honolulu, operated by the Department, and are currently meeting national and state discharge requirements. The eighth WWTP, the Waimanalo WWTP, is owned by the State of Hawaii, operated by the Department, and has not consistently met permit requirements as discussed later in this section. A summary of the wastewater treatment facilities permit requirements, compliance history, and potential changes in permit conditions are presented in Table 4.

The Sand Island WWTP is the largest of the facilities owned and operated by the City and County of Honolulu. The original 1990 NPDES permit for Sand Island WWTP required approximately 50 percent removal of suspended solids and essentially no chemical oxygen demand or biological oxygen demand (BOD) removal. The facility consistently met these requirements. In the early 1990's, environmental groups filed suit to require an upgrade in the treatment at the Sand Island WWTP. Subsequently, the Environmental Protection Agency (EPA) entered into formal discussions with the City to require that the Sand Island WWTP provide a minimum of 30 percent BOD removal. A number of operating and process modifications were made throughout the last few years to accomplish this level of treatment. These optimizations resulted in achieving compliance with the informal BOD removal standard of 30 percent in 1995. In addition, a new chemical treatment facility was installed in 1995 to assist in meeting the 30 percent BOD removal requirement.

A new permit for the Sand Island WWTP was issued on September 30, 1998. It is effective November 2, 1998 and is valid for a five-year period. Changes in the permit include revised BOD and suspended solids removal requirements and a new bacteriological limitation. The 1998-2002 CIP Projects include modifications required to accommodate growth and projects required by and identified in the permit.

The Waimanalo WWTP is a State-owned facility that is operated by the Department under contract. It accounted for only 0.5 percent of the total 1997 wastewater flow. The plant exceeded monthly average permit concentrations for BOD in June of 1997 and for total suspended solids (TSS) in July of 1997. Periodically, high influent BOD and TSS concentrations have been attributed to high infiltration/inflows (I/I) in the collection system, the absence of flow equalization facilities, and highly concentrated industrial discharges. Consequently, the original 1.1 mgd design capacity has been re-rated to 0.7 mgd. Planning has been completed for modification and expansion of the facility to correct these minor problems. Actions are underway to obtain State funding for these improvements.

Table 4 Discharge Requirements and Compliance History
City and County of Honolulu
Department of Environmental Services

Facility	Permit Type	Average Design Flow (mgd)	Approx. Current Flow (mgd)	Discharge Limit (mg/L) BOD	Discharge Limit (mg/L) TSS	Existing Treatment Level	Potential Changes in Discharge Requirements	Consistently Meets Requirements ?
Sand Island WWTP	NPDES	82	70.5	116	69	Primary	---	Yes
Honouliuli WWTP	NPDES	38	25.8					Yes
• Up to 25 mgd				160	95	Primary	---	
• Beyond 25 mgd				30	30	Secondary	To be upgraded to tertiary as needed for reuse	
Pa'alaa Kai WWTP	State DOH	0.14	0.11	30	30	Secondary	---	Yes
Waianae WWTP	NPDES	5.2	3.25	30	30	Secondary	---	Yes
Wahiawa WWTP	NPDES	2.5	1.97	30	30	Secondary	Pending project direction	Yes
Kailua Regional WWTP	NPDES	15.25	12.5	30	30	Secondary	---	Yes
Kahuku WWTP	State DOH	0.4	0.13	30	30	Secondary	---	Yes
Waimanalo WWTP[1]	State DOH	0.7	0.58	30	30	Secondary	---	Not consistently[2]

Notes:
(1) Owned by State of Hawaii, operated by the City and County of Honolulu.
(2) In 1997, the effluent concentration of BOD for the Waimanalo WWTP slightly exceeded 30 milligrams per liter (mg/L). Also, in July of the same year, the average effluent TSS concentration exceeded the 30 mg/L NPDES permit limit.

The Honouliuli WWTP NPDES Permit provides for up to 25 mgd of primary treated effluent to be discharged to the facility's ocean outfall. Flows in excess of 25 mgd are to be treated to secondary and tertiary levels for effluent reuse. The City and County of Honolulu has agreed with the EPA to enter into a consent decree to provide a schedule for implementing the full 13 mgd of tertiary treatment capacity of this facility. It is anticipated that the State Department of Health will issue an additional permit for the Honouliuli WWTP governing the implementation of effluent reuse.

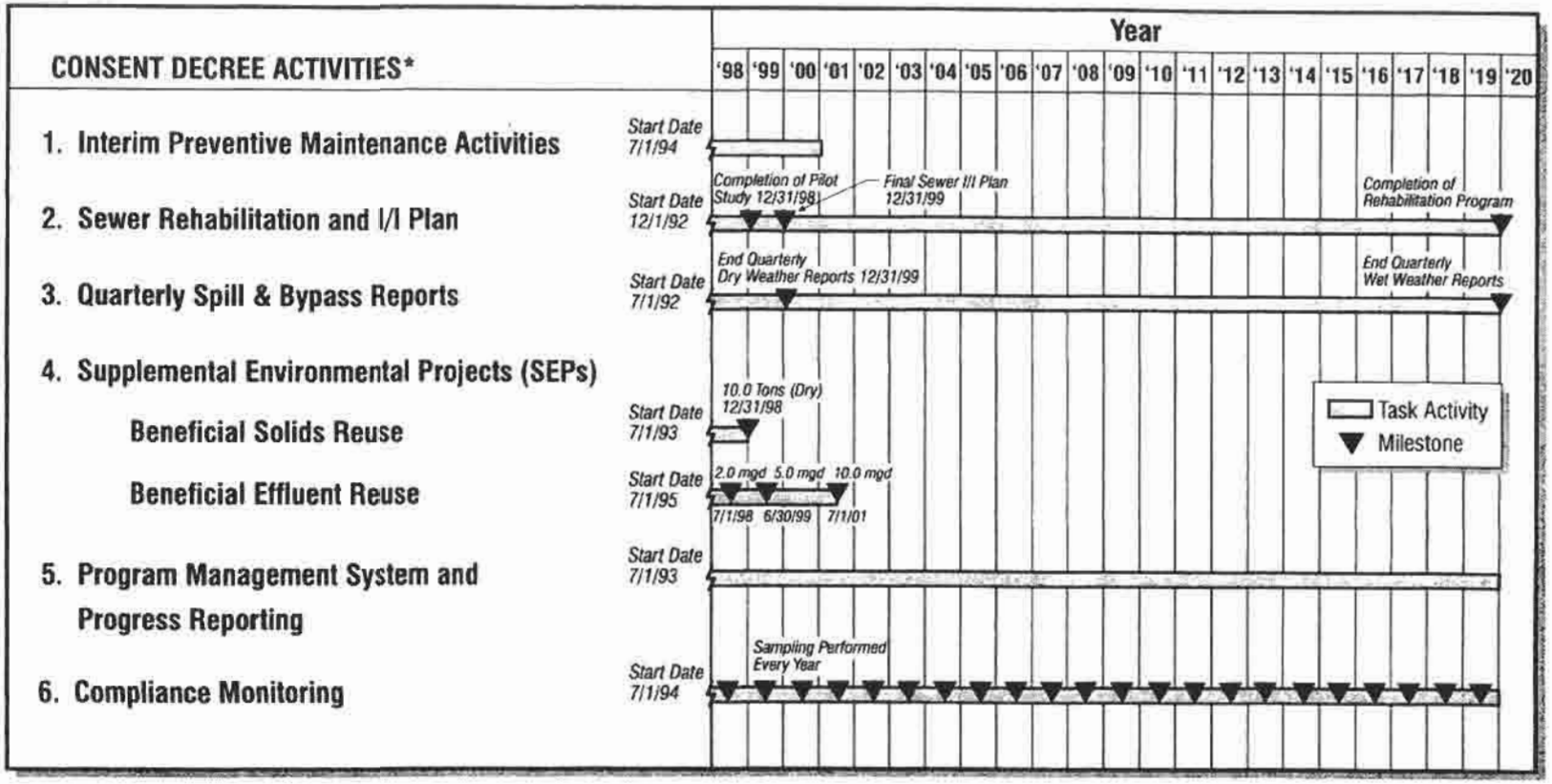
The Wahiawa WWTP currently has a State Permit to discharge secondary effluent to the Wahiawa Reservoir. The State Department of Health, however, has given the City direction to increase the level of treatment of effluent discharged to the reservoir to allow for beneficial use of the effluent both in the reservoir and by downstream agricultural users. Projects in the capital improvement plan are identified which will provide for a higher level of treatment of effluent from the Wahiawa WWTP, and thereby improve the water quality of the reservoir.

The Mililani WWTP was abandoned in the 1980's and raw wastewater is now diverted to the Honouliuli WWTP. Currently, raw wastewater passes through the abandoned plant site and flows by gravity and force main to the Honouliuli WWTP approximately 10 miles away. This diversion was made as a part of the regionalization by the City and County of Honolulu to reduce the number of wastewater treatment facilities. The capital improvement plan includes funding for facility plans to evaluate options to restore the facility and to reuse the treated effluent for a new athletic park nearby. This is consistent with the direction of the City and County of Honolulu to maximize water reuse as a component of the overall community water supply.

The community of Honolulu highly values a clean environment and has raised concerns about improving wastewater treatment at several of the City and County of Honolulu's wastewater treatment facilities. To address these concerns, the Department has worked with the community, the EPA, and the State of Hawaii Department of Health to develop several consent decrees. The consent decrees reflect agreed upon actions to meet the objectives of the City and County of Honolulu, the EPA, and other major participants for improvements to the existing wastewater systems. The consent decrees confirm the overall direction and schedule for the wastewater management program. A summary of the major consent decree milestones and associated due dates is presented in Figure 3. A summary of the four outstanding consent decrees and major objectives is presented in Table 5.

2.6 CAPITAL PROGRAM PLANNING AND FUTURE DIRECTION

The Department has prepared a 20-year CIP, which incorporates the results of several facility plans and preliminary designs for various wastewater facilities. The CIP was developed with a number of financial and engineering objectives in mind, including minimizing life cycle costs versus capital costs, improving project delivery cycles, increasing organizational effectiveness, and targeting staff reductions through attrition. It includes facility plans and preliminary designs for most of the major wastewater treatment facilities, and identifies collection system and piping improvements, which represent a majority of the capital improvement projects.



*Includes major milestones for the following:
309 Consent Decree, Honouliuli Consent Agreement,
Wahiawa Consent Decree, Kailua/Kaneohe Consent Decree

Figure 3
CONSENT DECREE
MILESTONES SCHEDULE
CITY AND COUNTY OF HONOLULU

Table 5 Summary of Consent Decree Objectives City and County of Honolulu Department of Environmental Services	
Honouliuli Consent Agreement (June 1993)	
•	Provide secondary treatment for flows that will be reused.
309 Consent Decree (May 1995)	
•	Revise and implement the City and County of Honolulu's pretreatment program
•	Establish a maintenance and sewer replacement/rehabilitation schedule to reduce and prevent sanitary sewer overflows (SSOs)
•	Develop beneficial reuse program for both wastewater and biosolids
Kailua/Kaneohe Consent Decree (August 1995)	
•	Allow participation of stakeholders in joint development Facilities Plan for Kailua Regional WWTP and Kaneohe WWPTF
•	Construct and operate pilot UV disinfection facility at Kailua Regional WWTP
•	Monitor water quality of the Kailua/Kaneohe watersheds in cooperation with the Kailua Bay Advisory Council
Wahiawa Consent Decree (March 1998)	
•	Provide a long-term solution for effluent disposal from Wahiawa WWTP
•	Improve reservoir water quality
•	Provide resource conservation through wastewater reclamation

The consent decrees are an important component of the long-term wastewater management program. The consent decrees reflect agreed upon actions to meet the objectives of the City and County of Honolulu, the EPA, and other major participants for improvements to the existing wastewater management program. The consent decrees confirm the overall direction and schedule for the wastewater management program and are supported by the specific activities and actions developed through the facility planning efforts in recent years.

The City and County of Honolulu has identified several capital improvement projects to meet consent decree requirements. The 1998-2002 CIP projects are recognized as the highest priority projects for meeting consent decree requirements, replacing severely corroded pipe, and for satisfying regulatory requirements. Information on the need for the 1998-2002 CIP projects, descriptions and estimated costs, and implementation schedules follow in Chapter 3. The long-term facilities needs, project descriptions, costs and implementation schedules are summarized in Chapter 4.

2.7 WASTEWATER FLOW PROJECTIONS

The wastewater flow and strength projections are based on the anticipated growth rates included in the City and County of Honolulu's General Plan. Growth is not a significant factor in driving the overall need for 20-year CIP projects. Only 17 percent of the 20-year CIP costs are associated with

projects required to accommodate growth. Growth for the total population of the City and County of Honolulu is presented in Figure 4 and is summarized by basin in Table 6. Wastewater flow projections through the year 2017 are presented in Figure 5.

Table 6 Historical and Projected Resident Population By Basin
City and County of Honolulu
Department of Environmental Services

Basin	1990	1995	2000	2005	2010	2015	2020
East Mamala Bay	361,452	374,123	384,558	398,266	413,654	422,254	431,586
West Mamala Bay	215,483	245,135	271,896	296,728	321,989	339,522	357,545
North Oahu (East/West)	18,458	18,534	18,369	19,233	20,100	20,554	21,003
Waianae	37,411	39,231	41,595	43,660	45,966	47,113	48,155
Central Oahu	43,886	44,332	44,646	43,903	43,678	43,239	43,115
Kailua/Kaneohe/Kahaluu	108,639	109,618	109,990	109,727	110,980	111,156	112,012
Waimanalo	9,055	9,397	9,487	9,583	9,820	9,920	10,071
Total	794,394	840,370	880,541	921,100	966,187	993,768	1,023,487

As shown in Figures 4 and 5, the projected increase in population and associated wastewater flows are not significant over the 20-year planning period. Population growth is projected to average less than 1 percent per year and associated wastewater flows are projected to increase by a similar percentage. The slight difference between projected population growth and wastewater flows is due to the planned reduction in unsewered areas with the conversion of cesspools to connect to the public sewage system. Also, for financial planning purposes, and to project revenues from new equivalent-single-family dwelling units (ESDUs) paying wastewater system facility charges, new connections, as shown in Figure 6, are conservatively projected to increase at a slower rate than General Plan population projections.

The majority of the population growth is expected to occur in the East and West Mamala Bay urbanized areas. In the next ten years, the Sand Island WWTP will require additional capacity in order to accommodate growth in the East Mamala Bay basin.

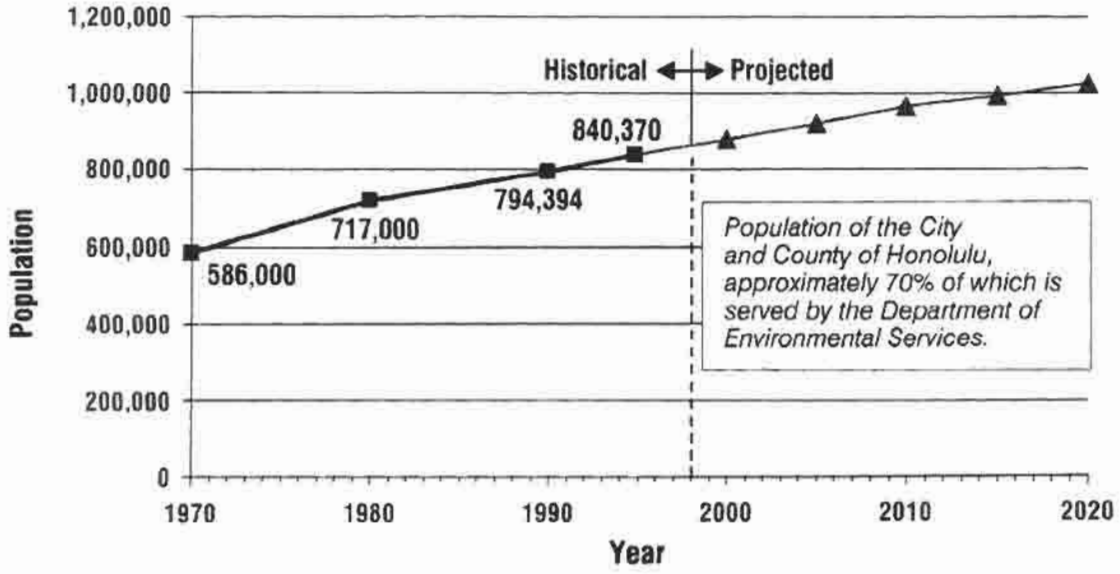
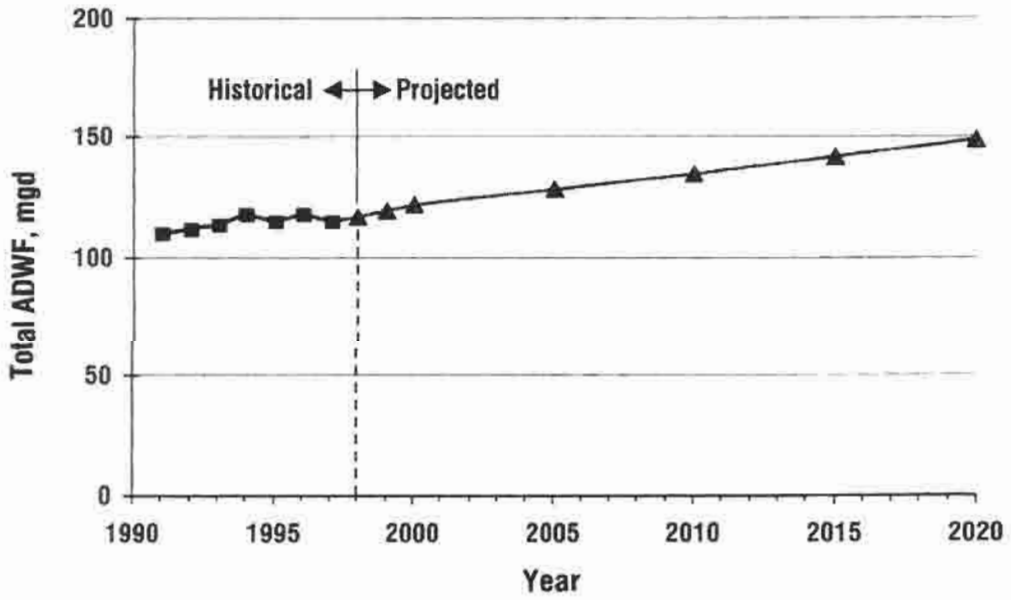
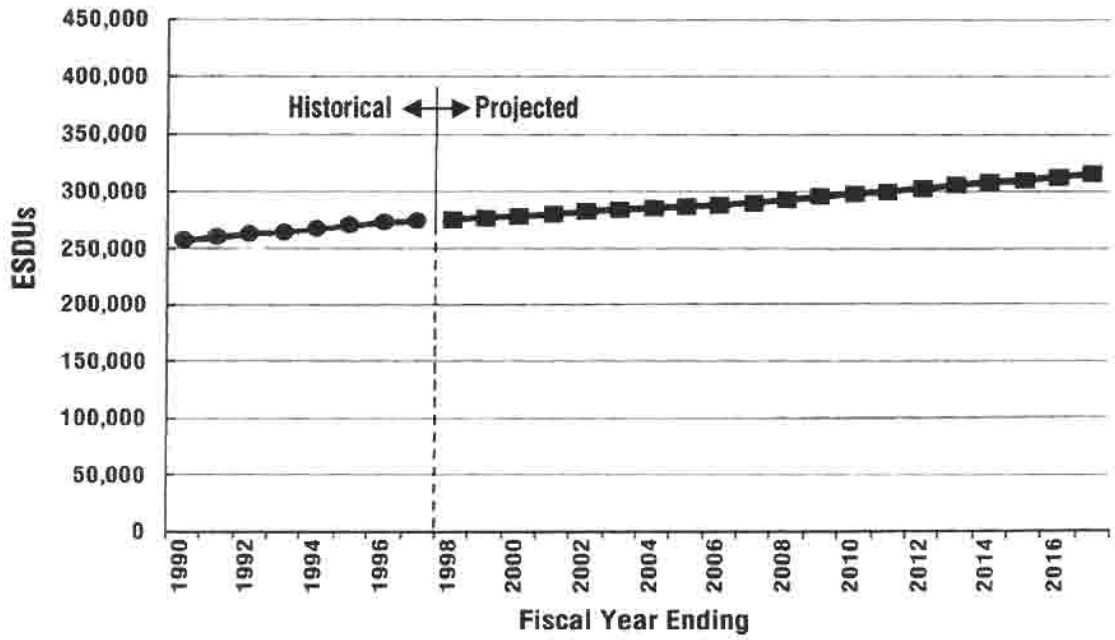


Figure 4
HISTORICAL AND PROJECTED POPULATION
CITY AND COUNTY OF HONOLULU



ADWF = Average Dry Weather Flow

Figure 5
WASTEWATER FLOW PROJECTIONS
CITY AND COUNTY OF HONOLULU



ESDU = Equivalent Single-Family Dwelling Unit

Figure 6
ESDU GROWTH PROJECTIONS
CITY AND COUNTY OF HONOLULU

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CIP Projects for Fiscal Years Ending 1998-2002

This chapter addresses the CIP projects planned for the fiscal years ending 1998-2002, with particular emphasis on the major capital facility expenditures for wastewater management projects anticipated through fiscal year 1999/2000. Other projects beyond fiscal year ending 2002 are addressed in Chapter 4.

3.1 NEED FOR THE PROJECTS

The 1998-2002 CIP projects were developed through a comprehensive planning process involving a review of facility needs throughout the island. During this review, prioritization criteria were developed and major projects were ranked. The prioritization criteria are summarized in Table 7. Non-discretionary prioritization criteria include safety and public health, permit and regulatory compliance, consent decree activities, and expansion-related needs, while discretionary criteria include reliability and preventative-related needs.

Table 7	**Prioritization Criteria City and County of Honolulu Department of Environmental Services**
Non-Discretionary	• Safety and Public Health • Permit Requirements and regulatory compliance • Consent Decree • Expansion
Discretionary	• Reliability • Improvement/Preventative

The 1998-2002 CIP projects fall into three general categories: collection system, wastewater treatment plant, and effluent reuse/disposal. The majority of the projects scheduled for this period are collection system projects, including pipelines and pump stations. The collection system improvement projects are needed to replace or rehabilitate corroded pipe, to reduce infiltration/ inflow, and to extend service to unsewered areas. Replacement of severely corroded pipe will reduce infiltration/inflow during wet weather events, and will result in lower operation and maintenance costs for both the collection systems and associated WWTP's. The collection system projects are described below in Section 3.2.

Treatment plant improvement project expenditures anticipated during fiscal years ending 1998-2002 are needed to upgrade existing facilities, to satisfy regulatory requirements, and to improve the reliability of the facilities in handling peak wet weather flows. WWTP improvement projects are described in Section 3.3.

The effluent reuse projects to be constructed during fiscal years ending 1998-2002 are needed to provide effluent reuse as a component of the overall community's water supply as agreed upon by consent decree, and, in the case of Wahiawa, to provide a long-term solution to the improvement of water quality in the Wahiawa reservoir. These projects are described in Section 3.4, below.

The general locations of the major CIP projects to be constructed in the first three years, from July 1997 to June 2000, are shown in Figure 7.

3.2 COLLECTION SYSTEM PROJECTS

The City and County of Honolulu have plans for a total of 35 collection system projects to begin construction or design between fiscal years ending 1998-2002, and have provided an allotment for smaller replacement projects which can be approved quickly. The total expenditures for these projects through the year 2002 is $163 million, with an expected $61 million to be expended within the first three years and $102 million to be spent in the remaining two years.

Approximately 20 percent of the amount for collection system funds to be expended between fiscal years ending 1998-2002 will be for the following five major projects:

- Nimitz Highway Reconstructed Sewer Project.
- Gulick Avenue Relief Sewer Project.
- Kalaheo Avenue Reconstructed Sewer Project.
- Hart Street Wastewater Pump Station Force Main Replacement Project.
- Hart Street Wastewater Pump Station Modification Project.

The Nimitz Highway Reconstructed Sewer Project and the Kalaheo Avenue Reconstructed Sewer Project will replace and repair severely corroded pipe. Concerns about existing pipe conditions include compromised structural integrity (public safety concerns), and excessive infiltration/inflow during wet weather events. The Gulick Avenue Relief Sewer Project will relieve present capacity deficiencies of approximately 1,800 feet of pipe in Gulick Avenue, will provide capacity for planned development, and includes rehabilitation of deteriorated pipe. The Hart Street Wastewater Pump Station Force Main Replacement Project will provide redundancy to one of the key force mains for the City of Honolulu, allowing transmission of flows to continue to the Sand Island WWTP from the Hart Street Pump Station in the case of a break in the 47-year old line. The Hart Street Wastewater Pump Station Modification Project will replace the existing pump station, which is experiencing structural problems due to age and corrosion.

The remaining collection system projects comprise 80 percent of the collection system expenditures between fiscal years ending 1998-2002, and include both non-discretionary and discretionary projects. Non-discretionary projects include projects to replace or rehabilitate severely corroded pipes (safety and public health concerns), to avert spills and possible EPA regulatory actions, and to meet expansion needs.

Discretionary projects include pump station modification projects and projects to improve the ability of the collection systems to handle peak flows. Pipe replacement/rehabilitation projects will reduce

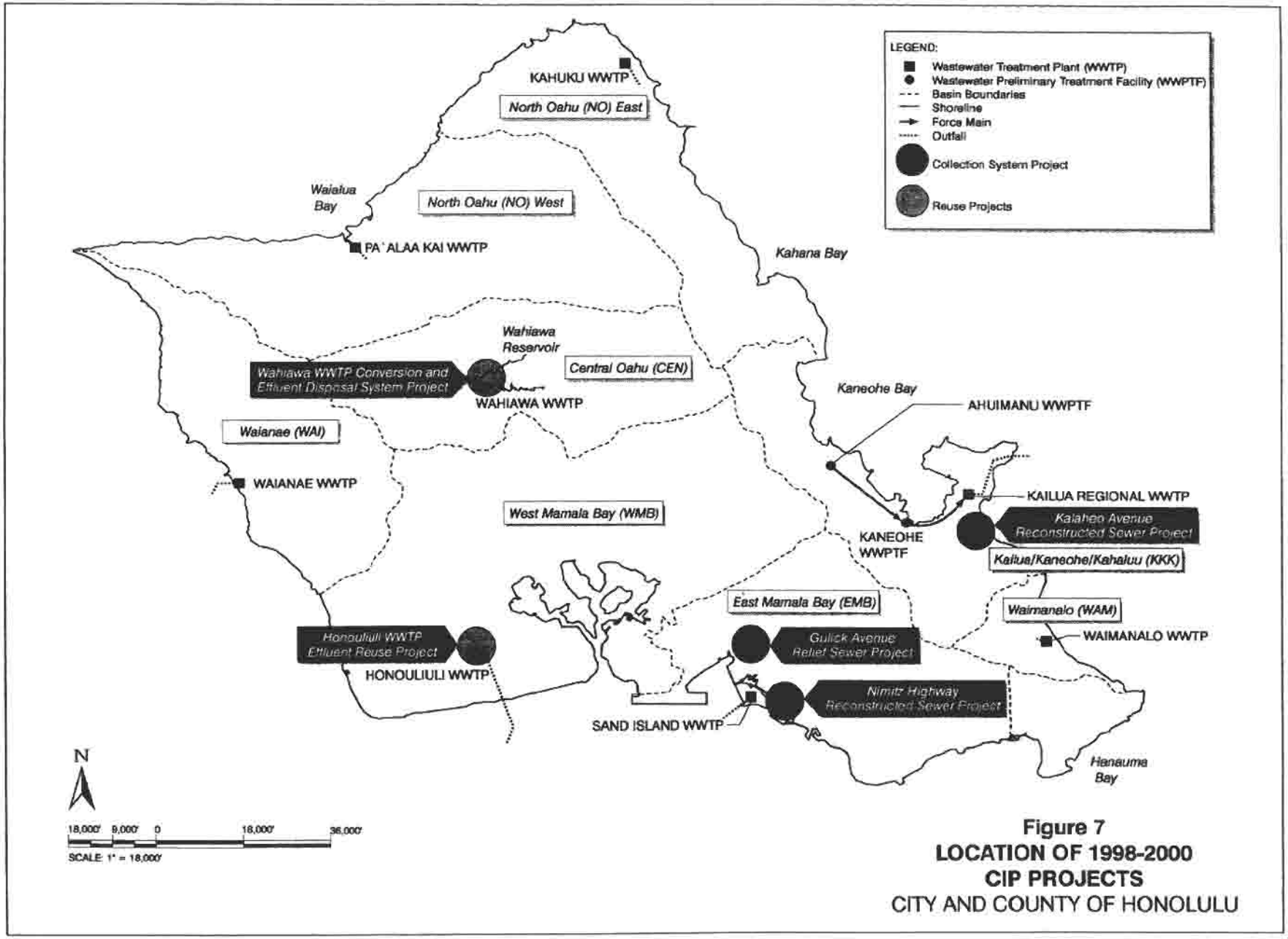


Figure 7
LOCATION OF 1998-2000
CIP PROJECTS
CITY AND COUNTY OF HONOLULU

inflow/infiltration and lower peak flows to the collection systems. Many existing pipes are over 40 years old, are unlined and severely corroded, and allow excessive amounts of inflow/infiltration during wet weather events. These existing pipes will be replaced with new pipes that are lined with or made from corrosion-resistant materials. New pipes will reduce the quantity of flow that is pumped and treated, and therefore will lower operation and maintenance costs for both collection systems and wastewater treatment facilities.

In summary, the collection system improvement projects scheduled to begin between fiscal years ending 1998-2002 include the highest priority collection system projects. The highest priority projects will correct extremely deteriorated and corroded pipe conditions, which in some cases have resulted in compromised structural integrity of existing pipes, and which in most cases results in added infiltration and inflow, sometimes causing overflows during wet weather conditions. Other projects will meet development needs, will improve system reliability or will eliminate the use of cesspools, which, if defective, contribute to potential public health concerns.

3.3 WASTEWATER TREATMENT PLANT IMPROVEMENT PROJECTS

The Department has planned for the design and/or construction of 22 WWTP improvement projects totaling $78 million between fiscal years ending 1998-2002. The most significant of these projects are the Sand Island Headworks Project, the Honouliuli WWTP 1A Solids Project, and the Kaneohe WWPTF Modifications Phase 3 Project.

The Sand Island WWTP Unit 1 Phase 2A Headworks Project will increase the wet weather flow handling capacity of the headworks from 210 mgd to 270 mgd and will improve the efficiency and performance of the plant. The project includes a new building with new bar screens, new grit chambers and a new flow splitting system.

The Honouliuli WWTP 1A Solids Project is needed to complete the recent expansion of the total primary treatment capacity of the plant from 25 to 38 mgd and the process upgrade of 13 mgd to secondary treatment. The project includes all new solids handling facilities, which may mirror existing facilities or may be a different process type. Although the Honouliuli WWTP 1A Solids Project is included in the Honouliuli Consent Decree, it is considered to be primarily an expansion project.

The Kaneohe WWTP Modifications Phase 3 Project involves a system upgrade to increase the wet weather capacity of the facility. The pump station will be upgraded and wet weather storage facilities will be added.

3.4 EFFLUENT REUSE PROJECTS

The Department has planned for the design and/or construction of 3 major effluent reuse projects between fiscal years ending 1998-2002, with anticipated total five-year reuse expenditures at $16 million. As discussed previously, effluent reuse projects are planned to meet consent decree requirements, to meet development requirements, and to improve the water quality of the Wahiawa Reservoir. The major effluent reuse projects are the Honouliuli Wastewater Treatment Plant

Effluent Reuse Project, the Wahiawa Wastewater Treatment Plant Conversion and Reuse Project, and the potential Mililani Water Reuse Project. These 3 projects account for over 90 percent of effluent reuse funds to be expended between fiscal years ending 1998-2002.

The Honouliuli WWTP Effluent Reuse Project, which will meet the effluent reuse requirement of the 309 Consent Decree, includes the construction of a 13 million gallons per day (mgd) tertiary treatment upgrade to the Honouliuli WWTP, a new pump station, and transmission mains for distribution of treated effluent. The reclaimed wastewater will be distributed to the effluent reuse users or recharged to the groundwater aquifer. The City and County of Honolulu is committed to increased effluent reuse and is currently negotiating a contract with a private firm to design, construct, and operate the Honouliuli Effluent Reuse Project for rapid implementation. To be assured that the consent decree requirements are satisfied, the Department has also developed contingency plans for conventional project delivery design and construction. The total capital construction cost of the City and County of Honolulu of the Honouliuli WWTP Effluent Reuse Project, as currently planned, is $2.1 million. Funding of the remaining estimated plant cost of approximately $11 million will be paid by the private contractor, while approximately $3 million has been budgeted for transmission mains. Users of the effluent have been identified and include a golf course that will soon be constructed adjacent to the site.

The Wahiawa WWTP Conversion and Effluent Disposal System Project consists of the modification and upgrade of the existing wastewater treatment facilities to support full reuse of effluent from the Wahiawa WWTP and eliminate effluent disposal to the Wahiawa Reservoir. The project includes treatment plant modifications and a distribution system for the full 1.6 mgd anticipated future average dry weather flow of the plant. This project will provide a long term solution for diverting effluent from the Wahiawa Reservoir, as required by the Wahiawa Consent Decree, and will partly fulfill the reuse requirements of the 309 Consent Decree.

In summary, effluent reuse costs account for less than 10 percent of the 1998-2002 CIP project expenditures. No significant revenues are projected to be received from the reuse program.

3.5 ONGOING CAPITAL PROGRAM

The Department's CIP in fiscal years ending 1998-2002 includes the new projects mentioned and numerous projects initiated in prior years. Eighty-four ($84) million in funds for these earlier projects were appropriated in years prior to and including fiscal year 1996/97 from proceeds of General Obligation (G.O.) bonds and State Revolving Fund (SRF) loans.

Major ongoing projects include a number of the City's largest pump facilities, including:

- Ala Moana Wastewater Pump Station - Modification and expansion of the facility to accommodate future increases in peak flows to nearly 200 mgd.
- Beachwalk WWPS and FM Replacement - Relocation and expansion of this 30 mgd pumping facility currently located in the heart of the tourism district of Waikiki.

- Hart Street WWPS and FM - Reliability and capacity upgrades of the City's second largest pump station and the addition of a new force main to parallel the existing aging force main.

Examples of other major ongoing projects include:

- Sand Island WWTP - Upgrade of the interiors of the clarifiers of Hawaii's largest wastewater treatment plant.
- North Shore Septage Handling Facility - Construction of a new septage handling facility to receive septage from this predominantly rural area utilizing primarily individual wastewater treatment systems.
- Sewer Rehabilitation and I/I Minimization Plan - This consent decree project began in 1993 and is scheduled for completion in 1999. This plan provides the strategic 20-year plan for the upgrade of facilities to minimize infiltration and inflows.

3.6 PROJECT MANAGEMENT

The Department has proven its capability in delivering projects on time and within budget. The Department's project delivery team has received several awards, including those awarded for the Nimitz Highway Relief Sewer Project:

- American Society of Civil Engineers, Hawaii Section, 1996 Outstanding Achievement Award.
- American Public Works Association, Hawaii Chapter, 1997 Project of the Year (Large Environmental).
- American Consulting Engineers Council, National Honor Award.

Examples of the Department's proven capabilities in meeting project milestones are listed below.

Waianae WWTP Secondary Treatment Upgrade

The Waianae WWTP was originally a 5.2 ADWF primary treatment plant which discharged its wastewater through an ocean outfall. During reapplication of their permit in the early 90s, the waiver of secondary treatment was denied and the plant was required to upgrade to secondary treatment. Design was completed in 1993 and construction was completed on time in 1995 and within the programmed budget of $25 million. In 1996 and 1997, the facility received the Gold Award from the AMSA.

Spill Prevention/Spill Containment Plan

As part of the original 309 consent decree, the City and County of Honolulu was required to develop a long-term strategy for the reduction of dry and wet weather spills. The spill prevention plan was to focus its effort on the pump stations and treatment plants and to proposed enhancements to the Wastewater Information Management System to more efficiently develop schedules for the

maintenance of gravity sewer lines. The plan was submitted to the EPA in early 1995 and accepted in April 1995.

Wastewater Information Management System (WIMS)

The base hardware and software installation for WIMS was completed in 1994 and is linked to the City's geographical information system for mapping of the sewer lines. This requirement was part of the 309 consent decree. Despite being installed, the system still required implementation from taking appropriate field data to optimizing the scheduling system. Internally developed procedures and correlation studies have progressed to reflect the following improvements: Field data efficiency (usable data) has improved from 43 percent in 1992 to 97 percent in 1997 and correlation studies on pipe conditions to pipe characteristics have led to a more optimized maintenance and replacement schedule. The WIMS system for optimizing sewer line maintenance and replacement schedules continues to improve. All the optimization efforts are being done in-house.

3.7 SUMMARY OF ESTIMATED PROJECT COSTS

The summary of costs for 1998-2002 CIP projects by project category is presented in Table 8. These costs include planning, design, and construction costs as well as all engineering, administrative, and legal expenses. As shown in Table 8, the 1998 Senior Bonds, totaling approximately $50 million, will partially finance the 1998-2002 CIP projects, with the balance to be primarily met from existing funds of the Department, annual revenues, and from the proceeds of future revenue bond issues.

Anticipated funding sources for the five-year capital improvement program are also summarized in Table 8. The 1998 Senior Bonds will partially fund the 1998 - 2002 CIP. Other major revenue sources anticipated for fiscal years ending 1998-2002 are Reimbursable G.O. Bond proceeds from bonds issued in years prior to and including fiscal year 1996/97, new State Revolving Fund loans, sewer service charge revenues, sewer facility charges, and proceeds from future revenue bonds.

Table 8 **Summary of Estimated CIP Project Expenditures, 1998-2002**
City and County of Honolulu Department of Environmental Services

Project	(Thousands of Dollars (1)) Fiscal Year 97/98	98/99	99/00	00/01	01/02	Total Expenditures 97/98 - 99/00	97/98 - 01/02
Expenditure Schedule							
Collection System Projects							
Consent Decree Projects	$75	$469	$551	$900	$1,269	$1,096	$3,265
Other Non-Discretionary Projects	1,285	14,739	32,359	29,853	27,088	48,383	105,324
Other Discretionary Projects	30	1,770	9,729	16,135	27,240	11,529	54,904
Subtotal : Collection System	$1,390	$16,978	$42,639	$46,888	$55,598	$61,007	$163,493
Treatment Plant Projects							
Consent Decree Projects	$90	$1,680	$6,240	$3,215	$110	$8,010	$11,335
Other Non-Discretionary Projects	0	30	2,228	12,368	22,684	2,258	37,310
Other Discretionary Projects	190	3,990	6,597	6,232	12,012	10,777	29,021
Subtotal : Treatment Plant	$280	$5,700	$15,065	$21,815	$34,807	$21,045	$77,666
Reuse Projects							
Consent Decree Projects	$0	$1,710	$3,675	$3,022	$2,434	$5,385	$10,841
Expansion Projects	0	100	290	1,076	3,662	390	5,128
Subtotal : Reuse	$0	$1,810	$3,965	$4,097	$6,096	$5,775	$15,968
Ongoing G.O. Bond Funded Projects	$36,230	$30,660	$14,830	$2,700	$0	$81,720	$84,420
Total CIP	$37,900	$55,148	$76,499	$75,500	$96,500	$169,548	$341,547
Anticipated Funding Sources for CIP Projects							
G.O. Bond Proceeds (previously issued)						$81,720	$84,420
SRF Loan Proceeds (new)						10,000	20,000
Sewer Facility Charges (connection fees)						5,174	8,876
Sewer Service Charges (pay as you go)						14,100	37,900
1998 Senior Series Revenue Bonds						50,000	50,000
Revenue Bonds (future)						30,000	165,000
Total Sources of Funds Available (2)						$190,994	$366,196

Notes:
(1) All costs are presented in inflated dollars, assuming 3% inflation per year, beginning in Fiscal Year 1999/00.
(2) Excess revenues available will be applied towards CIP project expenditures in future years.

The City and County of Honolulu Department of Environmental Services has identified facility needs through the year 2017 for the eight major WWTPs and associated collection system facilities. Cost estimates and implementation schedules for the projects have been developed for the planning period. This chapter provides an overview of the 20-year capital improvement needs of the Department.

4.1 LONG-TERM EXPANSION AND REHABILITATION NEEDS

A summary of the 20-year CIP project costs by wastewater basin and project category is shown in Figure 8. These include the 1998-2002 CIP projects as well as all other projects identified for the 20-year planning period. A summary of the estimated project costs for each of the wastewater basins for the 20-year period is also presented in Table 9. Table 9 lists the distribution of costs among project categories and allocates project costs to existing and new users. The three major project categories are: collection system improvements, WWTP improvements, and effluent reuse.

A summary of the 20-year CIP total costs by project category is shown in Figure 9. Approximately 69 percent of the total project costs are associated with collection system improvements, 26 percent with WWTP improvements, and 5 percent with effluent reuse projects.

A summary of the 20-year CIP total cost by primary project purpose is presented in Figure 10. As shown in Figure 10, approximately 84 percent of the total costs are associated with non-discretionary projects that must be completed in order to satisfy consent decree, permit/regulatory, expansion, and safety/public health requirements. The remaining 16 percent of the total costs are associated with discretionary projects that have been identified to improve wastewater treatment and collection systems. The Department has identified these discretionary projects in order to address reliability, improvement, and preventive maintenance concerns before they become non-discretionary projects.

Collection System Improvements

As shown in Figure 9, approximately two thirds of the 20-year CIP total costs are associated with improvements to the collection system. Some pipes in the existing collection system are approaching the end of their useful lives. This is due to the fact that the major pipeline facilities were installed 40 to 100 years ago, and the piping system is in a harsh underground environment. The harsh environment exists because of the saline content of the high groundwater table, and because of the relatively flat slopes and tropical temperatures which accelerates sulfide generation and corrosion rates.

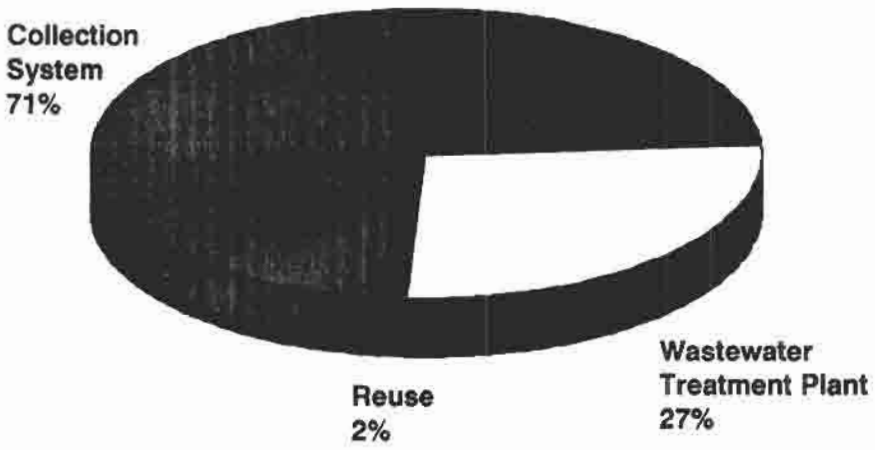


Figure 8
20-YEAR CIP BY PROJECT CATEGORY
CITY AND COUNTY OF HONOLULU

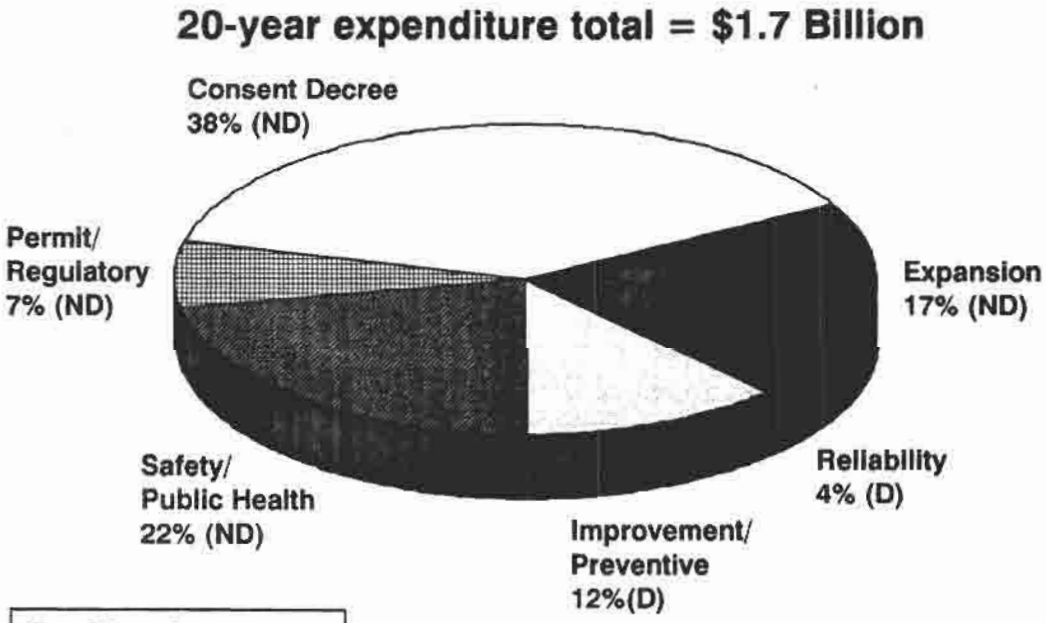


Figure 9
20-YEAR CIP BY PROJECT MAIN PURPOSE
CITY AND COUNTY OF HONOLULU

Table 9 **Summary of 20-Year Expenditure Allocations**
City and County of Honolulu Department of Environmental Services

	(Thousands of Dollars)					
	Project Category			Cost Allocation		
Basin	Collection System	Treatment Plant	Reuse	Rehabilitation (Existing Users)	Expansion (New Users)	20-Year Total
East Mamala Bay	$502,228	$136,033	$0	$558,862	$79,399	$638,261
West Mamala Bay	201,724	86,467	17,227	219,112	86,307	305,419
North Oahu (East)	0	12,688	0	8,214	4,475	12,688
North Oahu (West)	33,270	14,400	0	30,428	17,242	47,670
Kailua/Kaneohe/Kahaluu	196,962	161,522	0	310,991	47,494	358,484
Waianae	35,730	2,755	0	31,724	6,761	38,485
Central Oahu	2,600	4,645	4,462	11,418	288	11,706
Waimanalo	33,721	17,413	6,325	36,899	20,561	57,459
Miscellaneous Projects	157,844	22,473	350	164,416	16,251	180,667
Total : New	$1,164,079	$458,397	$28,364	$1,372,063	$278,777	$1,650,840
Ongoing Projects						$84,420
Total CIP						$1,735,260

Notes:
All costs are presented in 1998 dollars.

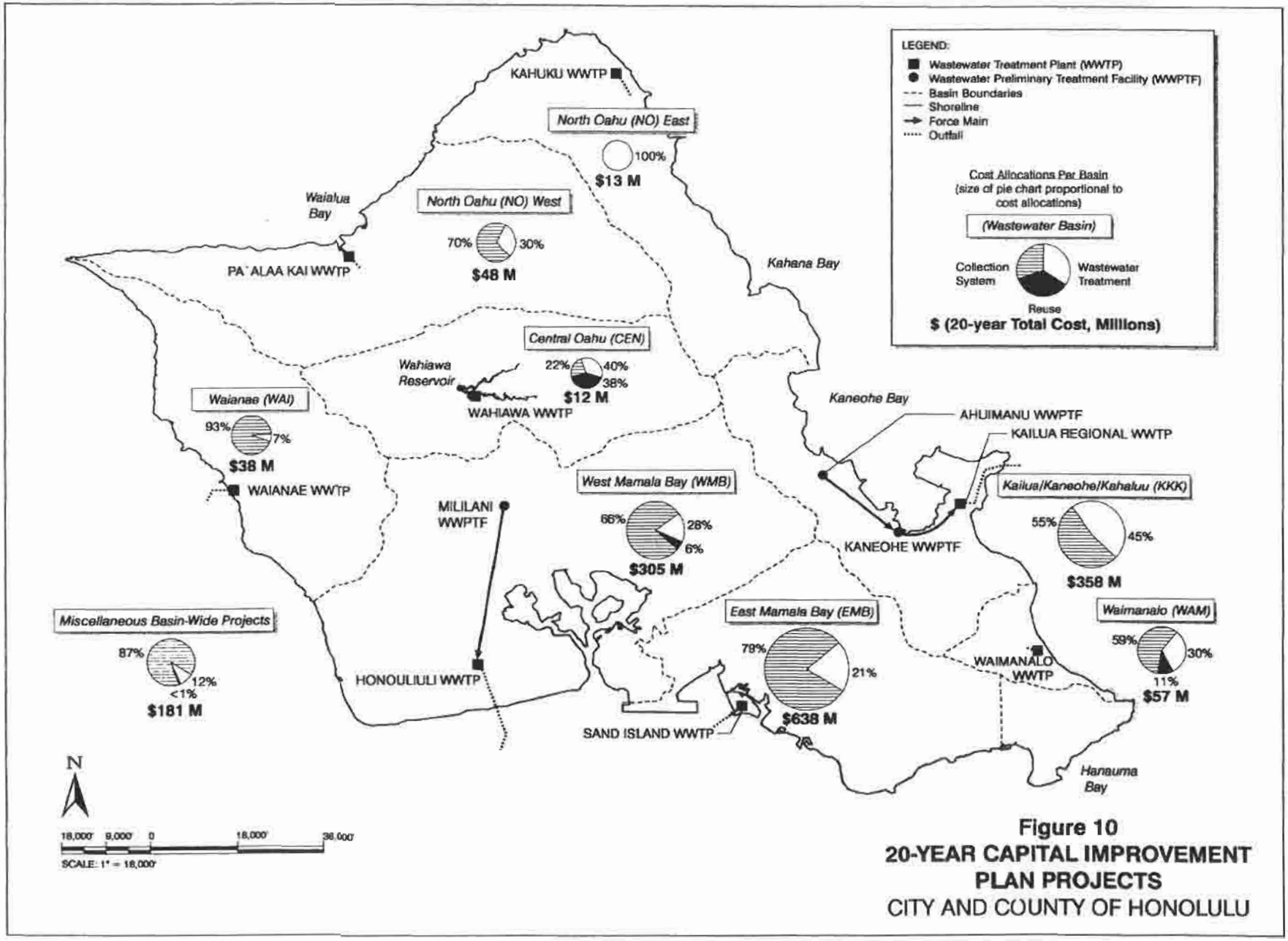


Figure 10
20-YEAR CAPITAL IMPROVEMENT PLAN PROJECTS
CITY AND COUNTY OF HONOLULU

The deteriorated condition of the collection system has resulted in excessive infiltration, inflow, and collection system overflows during wet weather events. This results in increased operation and maintenance costs for both the collection system and treatment plant facilities. The consent decree action items address these issues through a comprehensive rehabilitation program beginning with the high priority projects. The 1998-2002 CIP projects include most of the highest priority collection system projects.

Wastewater Treatment Plants Improvements and Reuse

The three major wastewater treatment plants are the Sand Island WWTP, the Honouliuli WWTP, and the Kailua Regional WWTP. Separate facility plans have been completed for each of these major facilities. The facilities plans identify future needs for system improvements and to accommodate growth. Some facility plans are currently being updated.

A facilities plan layout for the Sand Island WWTP is shown in Figure 11. The major projects to be completed within the 20-year planning horizon for the plant include:

- Construction of higher capacity headworks to replace the existing headworks.
- Modifications to existing primary clarifiers, and addition of new primary clarifiers.
- Expansion of the existing sludge conditioning system, or replacement of the system with new anaerobic digesters and power generation facilities.
- New disinfection facilities.

A facilities plan layout for the Honouliuli WWTP is shown in Figure 12. The major projects identified for the plant include:

- Process upgrades to allow for beneficial reuse of wastewater.
- A new effluent reuse distribution system.
- Expansion of the solids handling facilities to accommodate the recently completed plant expansion.

A facilities plan layout for the Kailua Regional WWTP is shown in Figure 13. The major facility project requirements identified for the planning horizon for the Kailua Regional WWTP include:

- New disinfection facility improvements.
- Pump station facility improvements.
- Wet weather handling facility improvements.

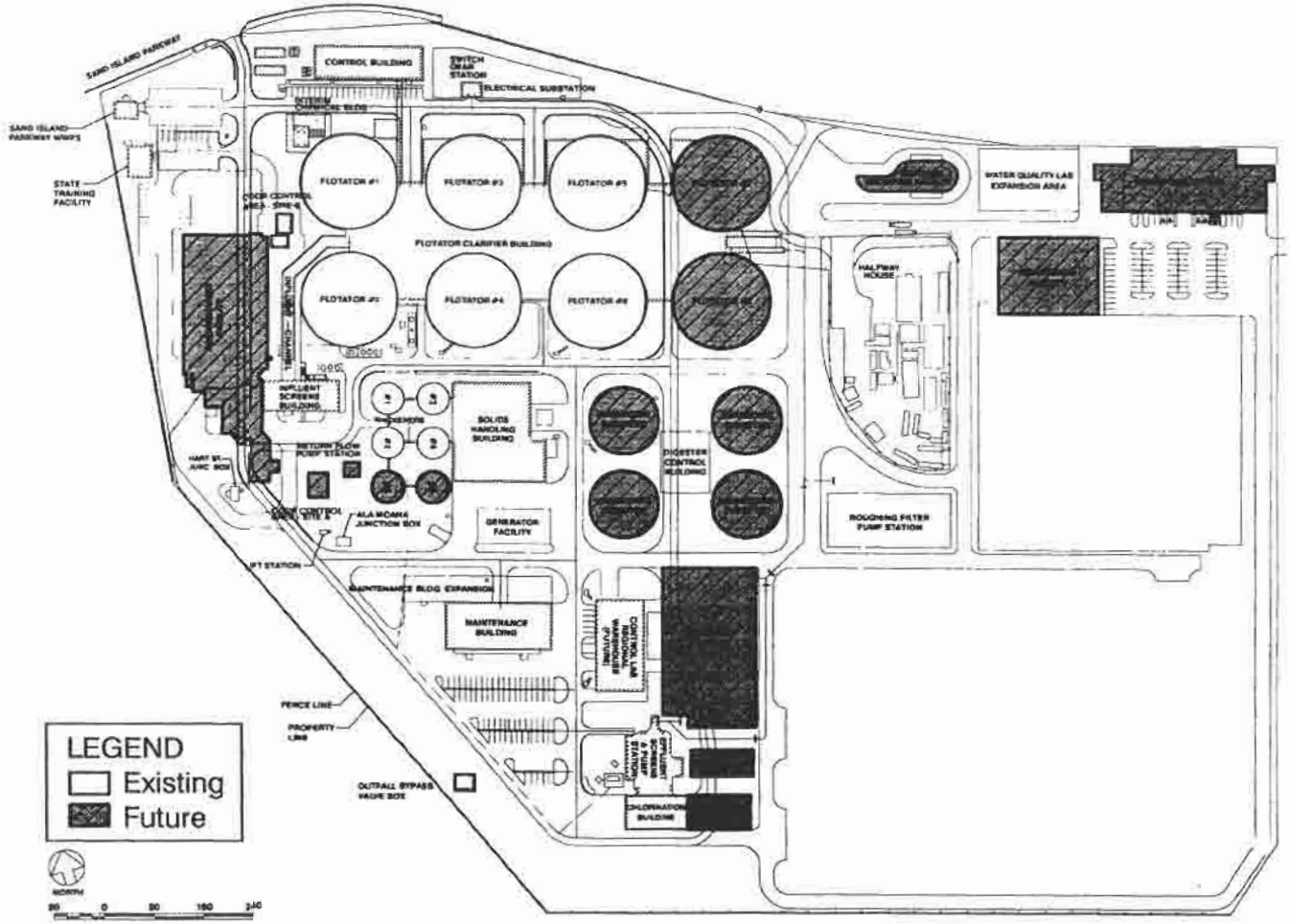


Figure 11
SAND ISLAND WWTP
FACILITIES LAYOUT
CITY AND COUNTY OF HONOLULU

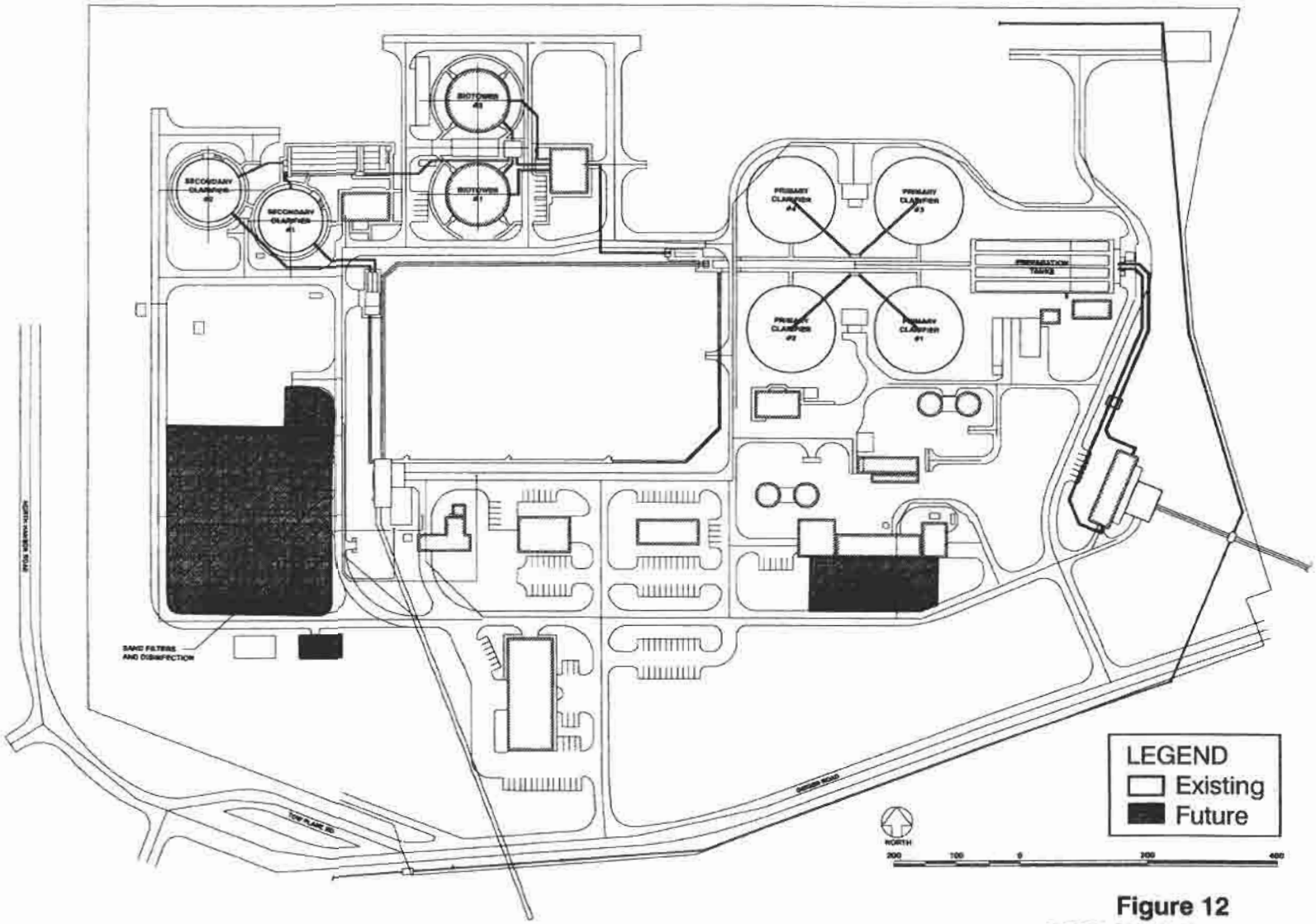


Figure 12
HONOULIULI WWTP
FACILITIES LAYOUT
CITY AND COUNTY OF HONOLULU

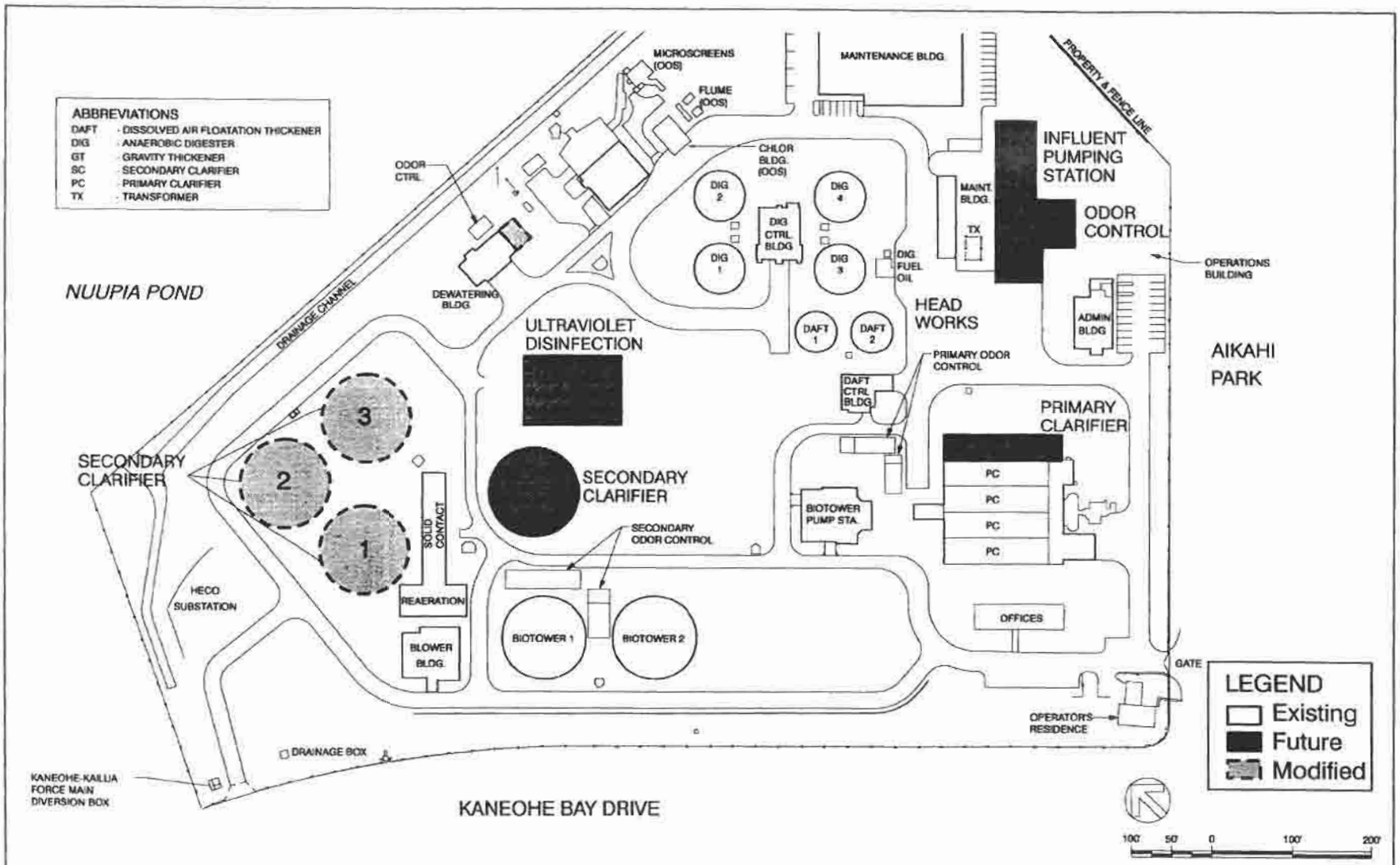


Figure 13
KAILUA WWTP
FACILITIES LAYOUT
CITY AND COUNTY OF HONOLULU

4.2 COST OF FUTURE PROJECTS

Estimated capital project costs for future facilities have been developed for each of the eight wastewater basins. The capital cost estimates include land acquisition, planning, design, construction, construction management, and all other costs required to deliver a completed project.

A summary of the estimated project costs and expenditure schedules by five-year period are shown in Table 10. This table presents the planned project expenditures for each of the eight major wastewater basins.

A summary of the historical and projected annual capital expenditures is shown in Figure 14. As shown in Figure 14, there has been a steady increase in annual capital project expenditures from 1985 through 1997, which is anticipated to continue through 2017. This trend is the result of several considerations. The first is that historical project expenditures were predominately for planning and design as shown in Figure 14. In the future, projected capital expenditures are anticipated to be primarily attributable to construction, because planning and design have already been completed for a substantial number of the 20-year CIP projects.

4.3 TIMING OF FUTURE PROJECTS

The implementation schedule for the 20-year CIP projects is presented in Figure 15. This implementation schedule shows the timing of major projects necessary to replace and rehabilitate deteriorated pipes, to accommodate increased wastewater flows and loadings due to anticipated growth, and to meet consent decree scheduled activities. As shown, some of the current CIP projects are already funded through planning and design. Others will be funded from the proceeds of the 1998 Wastewater Revenue Bonds, the existing capital reserves, and future bond issues. Funding for the projects is discussed in Chapters 5 and 6.

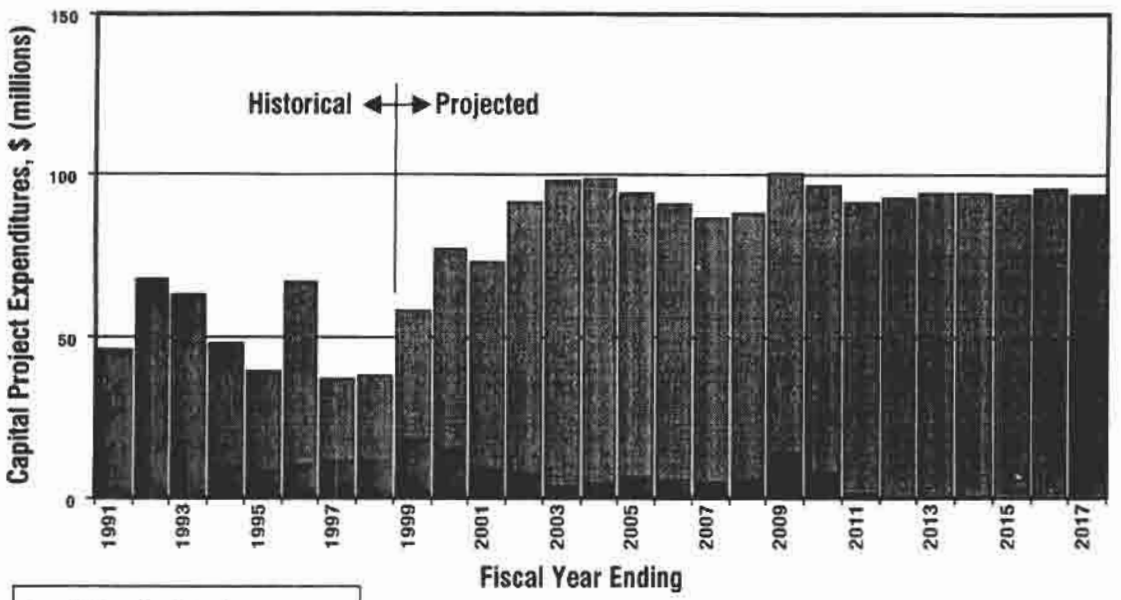
4.4 GROWTH RATE CONSIDERATIONS

Projects associated with growth account for only 17 percent of the 20-year CIP total costs. Most of the 20-year CIP projects are driven by other factors such as consent decree requirements, rehabilitation and replacement of existing aging infrastructure, and public safety.

Table 10 **Summary of 20-Year Projects Expenditure Schedule**
City and County of Honolulu Department of Environmental Services

Basin	(Thousands of Dollars) FYE 98 - FYE 02	FYE 03 - FYE 07	FYE 08 - FYE 12	FYE 13 - FYE 17	20-Year Total
East Mamala Bay Sand Island WWTP Hart Street WWPS Beachwalk WWPS	$88,589	$261,400	$44,264	$244,008	$638,261
West Mamala Bay Honouliuli WWTP Mililani WWPTF	59,712	57,674	152,295	35,737	305,419
North Oahu (East) Kahuku WWTP	317	772	10,417	1,182	12,688
North Oahu (West) Pa'alaa Kai WWTP	0	102	38,600	8,968	47,670
Kailua/Kaneohe/Kahaluu Kailua WWTP Kaneohe WWPTF Ahuimanu WWPTF	68,029	86,699	111,248	92,508	358,484
Waianae Waianae WWTP	0	173	16,851	21,461	38,485
Central Oahu Wahiawa WWTP	6,663	1,608	3,338	98	11,706
Waimanalo Waimanalo WWTP	0	161	40,456	16,842	57,459
Miscellaneous Projects	17,065	47,915	58,687	57,000	180,667
Total New	$240,376	$456,504	$476,156	$477,804	$1,650,840
Ongoing Projects	$84,420				$84,420
Total CIP	$324,796	$456,504	$476,156	$477,804	$1,735,260

Notes:
All costs are presented in 1998 dollars.
FYE = Fiscal Year Ending



All cost are shown in 1998 dollars.

Figure 14
HISTORICAL AND PROJECTED CAPITAL PROJECT EXPENDITURES
CITY AND COUNTY OF HONOLULU

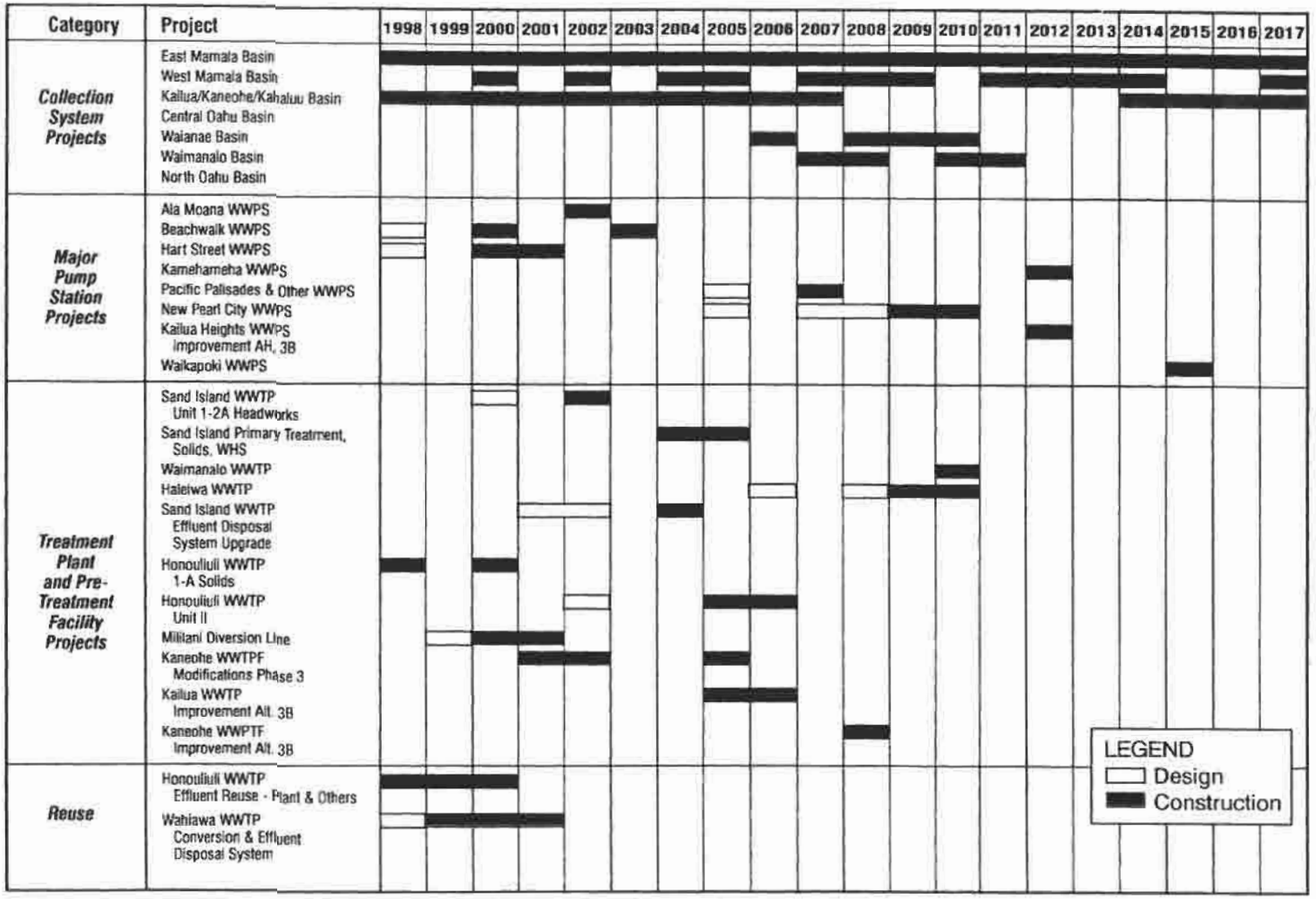


Figure 15
20-YEAR PROJECT
IMPLEMENTATION SCHEDULE
CITY AND COUNTY OF HONOLULU

Chapter 5

CURRENT AND FUTURE SEWER SERVICE AND SYSTEM FACILITY CHARGES

Sewer service charges and system facility charges are levied by the City and County of Honolulu to fund the major costs associated with capital improvements and operation and maintenance of the wastewater system. This chapter addresses the current and future charges.

5.1 SOURCES AND USES OF FUNDS

The City and County of Honolulu's Department of Environmental Services revenues are currently derived from three major sources: monthly sewer service charges, system facility charges, and interest earned on fund balances. Of these, sewer service charges are the major source of revenue followed by system facility charges. The summary of these two major sources of funding and the major sources and uses of these funds is shown in Table 11.

Table 11 Major Categories of Revenue Sources and Uses
City and County of Honolulu
Department of Environmental Services

Source of Funds	Who Pays	Use of Funds
Sewer Service Charges	Existing Users	O&M Costs for Existing Facilities
		Replacement of Existing Facilities
		Construction to Improve Treatment
System Facility Charges	New Users	Construction to Accommodate Growth
		Construction to Improve Treatment

In the past, property taxes have been used to cover annual debt service on general obligation bonds incurred for capital construction costs of wastewater facilities. However, the City and County made the decision in 1993 to recover all wastewater debt costs through user charges. Wastewater revenues currently fund all annual debt service on previously issued reimbursable General Obligation Bonds allocated to wastewater, and the City Council's policy is to not fund any new wastewater capital improvements directly through property taxes or with G.O. bonds.

State Revolving Fund (SRF) proceeds have been a reliable source of funding for wastewater projects, averaging over $5 million per year, as shown in Table 12. The SRF proceeds are anticipated to continue at $5 million annually through 2007, as shown in Table 14 in Chapter 6.

Sewer service charges and system facility charges fund the major portion of costs incurred by the Department. The major cost components funded by sewer service charges and system facility charges are as follows:

Operation and maintenance of WWTP's and collection system facilities including pumping and cesspools.

Planning, design and construction of capital projects for rehabilitation, improvement and expansion.

Annual debt service for obligations incurred for construction of existing facilities.

Maintenance of appropriate reserves.

System facility charge revenues are used to fund capital projects. The City and County of Honolulu currently maintains Sewer Fund (#170), which, as of July 1, 1997, had a balance of approximately $59,080,000. This fund is available for operations and wastewater capital costs.

Interest earned on reserves is available to pay debt service and is retained in the respective reserve or used as appropriate.

Monthly sewer service charges fund operation and maintenance costs and debt service on non-growth related CIP costs.

5.2 HISTORICAL REVENUES AND EXPENDITURES

A five-year summary of historical revenues and expenditures is shown in Table 12. Sewer service charges have been held constant since July 1, 1993. New connections have averaged approximately 2,500 equivalent single-family dwelling units (ESDU) per year between 1992 and 1997. System facility charges have been held constant since fiscal year 1991-1992.

5.3 EXISTING RATES AND CHARGES

Summaries of current sewer service charges are presented in Table 13. As discussed, sewer service charges have been held constant since September 1, 1993. The current City and County of Honolulu sewer service charge established in the current sewer service ordinance for single-family residences averages approximately $33.65 per month. New connections have averaged approximately 2,500 equivalent single-family dwelling units (ESDU) per year over the past five years. Wastewater system facility charges have been held constant at $1,146 per (ESDU) since 1991-1992.

5.4 COMPARISON WITH RATES CHARGED BY OTHER AGENCIES

Several considerations are important when making sewer service charge and system facility charge comparisons for the City and County of Honolulu with other agencies. These considerations include the following:

Economies of scale are difficult to achieve due to small service areas.

Table 12 Historical Wastewater Revenues and Expenditures (1)
City and County of Honolulu Department of Environmental Services

Fiscal Year	(Amount in $ Millions) 93/94	94/95	95/96	96/97
ESDUs Served				
Residential ESDUs at Start of Year	189,987	192,978	194,379	196,879
Non-Residential ESDUs, Start of Year	76,941	77,130	77,280	77,359
Total ESDUs at Start of Year	266,928	270,108	271,659	274,238
Non-Residential New ESDUs Added	189	150	79	202
Total New ESDUs Added (2)	3,180	1,551	2,579	1,453
Residential Charges				
Monthly Sewer Service Charge	$33.65	$33.65	$33.65	$33.65
% Increase Over Prior Year	30.5%	0.0%	0.0%	0.0%
Sewer Facility Charge	$1,146	$1,146	$1,146	$1,146
% Increase Over Prior Year	0.0%	0.0%	0.0%	0.0%
Estimated Cashflow and Coverage				
Revenue				
Service Charges	$105.3	$109.6	$111.5	$111.0
Sewer Facility Charges	3.9	3.5	1.8	1.2
Other Revenues (3)	0.2	0.3	0.4	0.2
Total Revenues	$109.4	$113.4	$113.7	$112.4
O&M Expenses				
General Government	$1.3	$1.5	$2.4	$2.4
Highways and Streets	0.0	0.1	0.1	0.2
Sanitation	51.8	51.8	58.7	51.4
Miscellaneous	6.8	8.1	9.6	9.7
CASE	5.6	5.4	6.2	5.5
Rent	0.0	0.0	0.0	0.7
Other	0.0	0.0	0.0	0.2
Total O&M Expenses	$65.5	$66.9	$77.0	$70.1
One-time Expenses	$0.0	$1.8	$7.0	$13.2
Net Revenues	$43.9	$44.7	$29.7	$29.1
Debt Service: Revenue Bonds	$0.0	$0.0	$0.0	$0.0
Debt Service: G.O. Bonds and SRF Loans	$24.5	$31.7	$33.4	$35.9
Total Debt Service	$24.5	$31.7	$33.4	$35.9
Coverage Ratio: Total Debt	1.79	1.41	0.89	0.81
Capital Project Financing				
Capital Expenditures	$23.5	$37.1	$17.4	$34.2
Reimbursable G.O. Bond Proceeds	8.3	9.8	11.5	34.2
SRF Loan Proceeds	15.2	27.3	5.9	0.0
GAAP Fund Balances (beginning of fiscal year)				
Sewer Fund (4)	$30.8	$50.9	$62.4	$63.6
System Facility Charge Fund	$6.0	$3.0	$2.5	$0.3
Total Beginning Balance	$36.8	$53.9	$64.9	$63.9

Notes:
(1) Does not include Hawaii Kai, a privately owned and operated facility.
(2) Does not reflect ESDUs changed or removed.
(3) Includes cesspool pumping, connection, and lateral installation charges.
(4) Includes reserves for encumbrances.

Table 13 Summary of Current Sewer Rate Ordinance
City and County of Honolulu
Department of Environmental Services

	Effective September 1, 1993
	Standard
Residential Sewer Service Charges	
Single family and duplex dwellings served by City water system per dwelling unit per month:	
Monthly base charge	$24.85
Monthly usage charge	
First 2,000 gallons of metered water consumed	No Charge
Charge per 1,000 gallons over 2,000 gallons, the water consumed reduced by the irrigation factor of 18%	1.05
Single family and duplex dwellings not served by City water system per dwelling unit per month	33.65
Multiple-unit dwellings served by City water system per dwelling unit per month:	
Monthly base charge	17.40
Monthly usage charge	
First 2,000 gallons of metered water consumed	No Charge
Charge per 1,000 gallons over 2,000 gallons, the water consumed reduced by the irrigation factor of 18%	1.05
Multiple-unit dwellings not served by City water system per dwelling unit per month:	23.55
Nonresidential Sewer Service Charges	
Domestic Strength Wastewater	
1. Metered Water Usage	
a. if 9,000 gallons or less per month	
1) Monthly base charge	22.35
2) Charge per 1,000 gallons	0.13
b. If more than 9,000 gallons per month	
1) Charge per 1,000 gallons	2.49
2. Metered Wastewater Discharge	
a. If 7,000 gallons or less per month	
1) Monthly base charge	22.35
2) Charge per 1,000 gallons	0.16
b. If more than 7,000 gallons per month	
1) Charge per 1,000 gallons	3.12
	Effective 1991/92 (Dollars)
Wastewater System Facility Charge per ESDU	1,146

Note: There is also an extra strength charge that applies for high strength wastewater.
ESDU = Equivalent Single Family Dwelling Unit

Historically, system facility charges have been low.

Equipment costs are high due to the remote location of the island from major suppliers.

Electrical costs on the island are high.

Remote facilities and rough terrain add to system complexity and cost.

The harsh salt water environment increases ongoing maintenance costs, reduces useful life of facilities and leads to excessive infiltration and inflow conditions due to the accelerated deterioration of collection systems.

A comparison of the single family monthly sewer service charge and system facility charge of the City and County of Honolulu to those charges and fees of other similar agencies throughout the United States is presented in Figures 16 and 17. These comparisons are made on an equivalent cost basis and take into consideration local agency charges for collection systems as well as property tax revenues in addition to the monthly user rate. As shown in Figure 17, the current system facility charge for the City and County of Honolulu is among the lowest of the agencies surveyed.

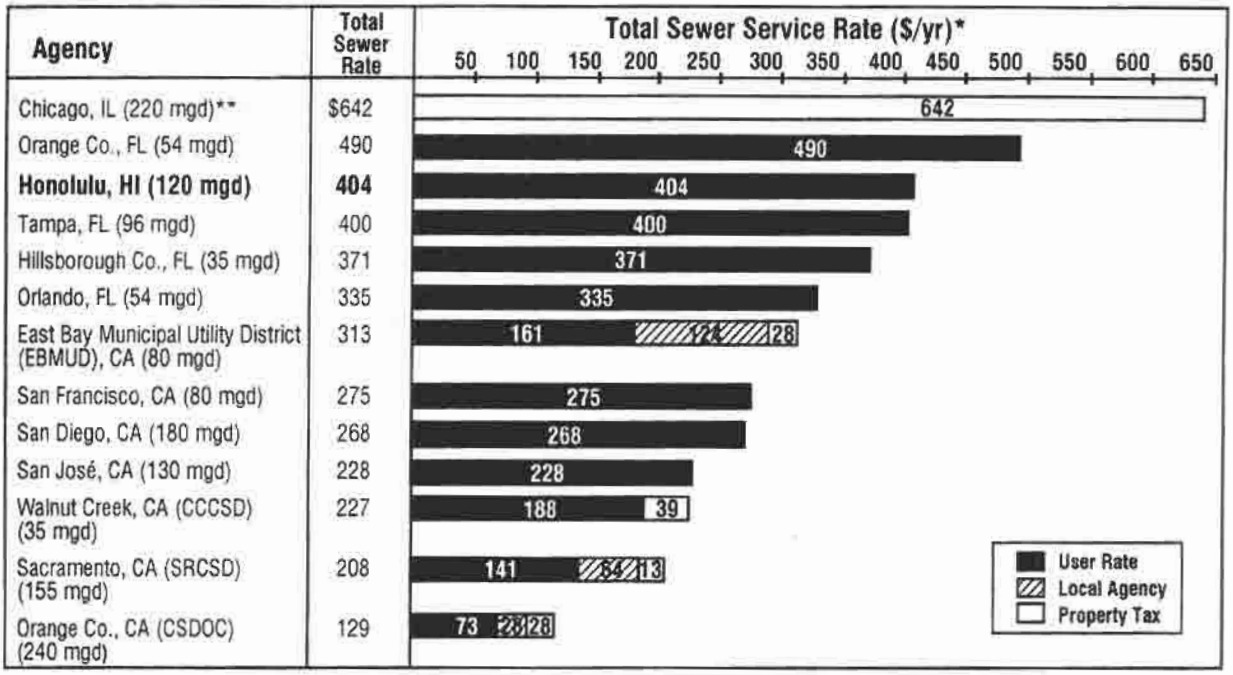
5.5 PROJECTED RATES AND CHARGES

Historical and projected sewer service and system facility charges are presented in Figure 18. It is anticipated that both sewer service and system facility charges will increase beginning in fiscal year 1999/2000.

Sewer service charges have been the subject of considerable public discussion since the last increase in 1993. Of particular concern has been the unlimited inclusion of water use in the volume component of the charge. Over the past two years, the Department has undertaken an evaluation of the rate structure, including a consultant study and a series of public meetings, and has recommended a revenue neutral revision to the rate structure to address the irrigation water issue and increase fairness. Throughout this process, and in numerous other public outreach settings, the Department has identified the need for future rate increases to support necessary measures to provide appropriate service and ensure public health.

As shown in Figure 18, the system facility charge is planned to increase slightly in fiscal year 1999/2000. Revenues from system facility charges represent a minor proportion of revenues in comparison to sewer service charges, as reflected in Figure 19.

The City Council has not yet approved the adoption of sewer service and system facility charges beyond fiscal year 1997/1998. The City Council has adopted a set of Debt and Financial Policies for its wastewater system that require, among other things, the City to maintain a 1.60 times coverage for its Senior Revenue bonds and 1.25 times coverage for all Revenue Bonds (Senior and Junior). It is expected that the City will adopt annual increases in sewer service and system facility charges necessary to meet the debt service coverage requirements prescribed in its Debt and Financial Policies.

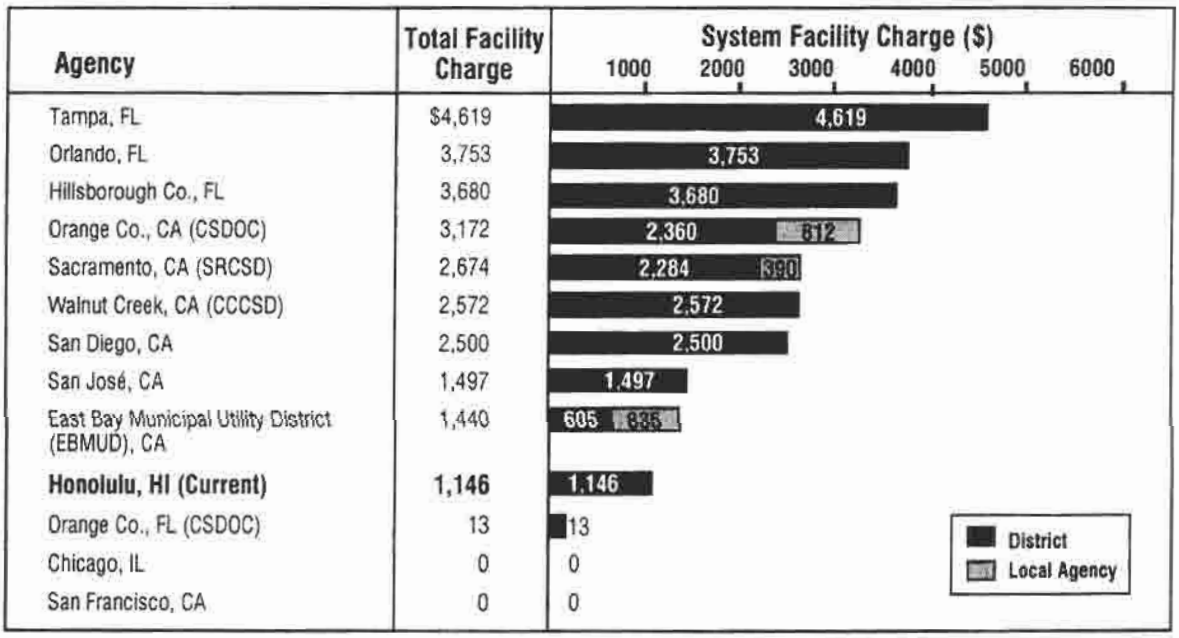


* *Total of user rate (treatment / disposal), local agency and property taxes*

** *Fee is based on property tax assessment. Average fee calculated based on 1990 census average home value.*

All rates shown based on current (1998) ordinances.

Figure 16
COMPARISON OF RESIDENTIAL SEWER SERVICE CHARGES
CITY AND COUNTY OF HONOLULU



All charges shown based on current (1998) ordinances.

Figure 17
COMPARISON OF RESIDENTIAL SYSTEM FACILITY CHARGES
CITY AND COUNTY OF HONOLULU

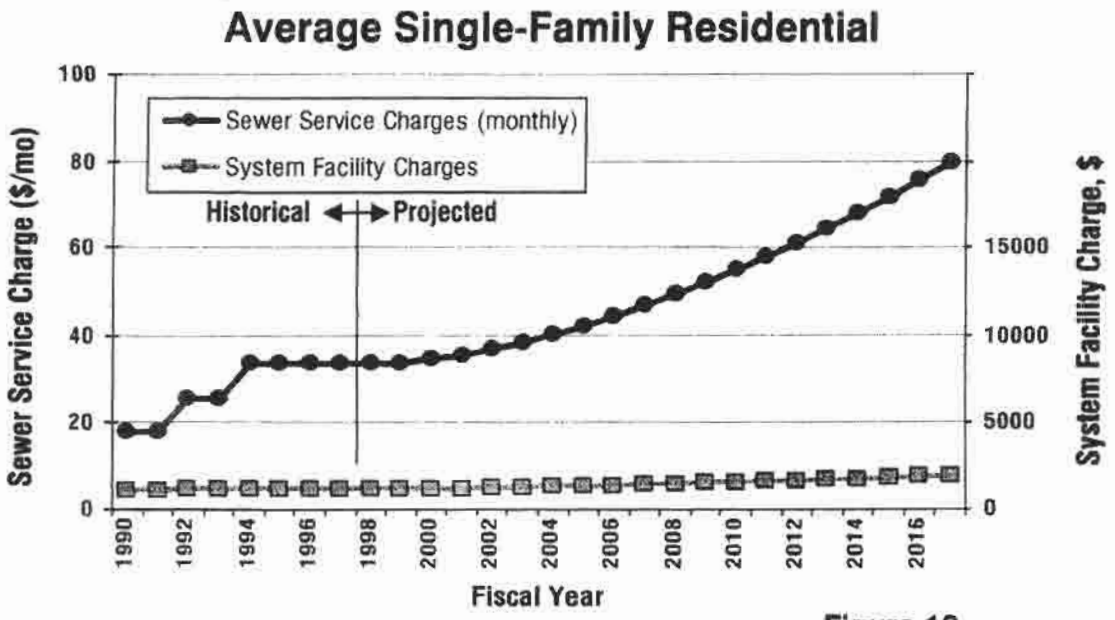


Figure 18
HISTORICAL AND PROJECTED SEWER SERVICE AND SYSTEM FACILITY CHARGES
CITY AND COUNTY OF HONOLULU

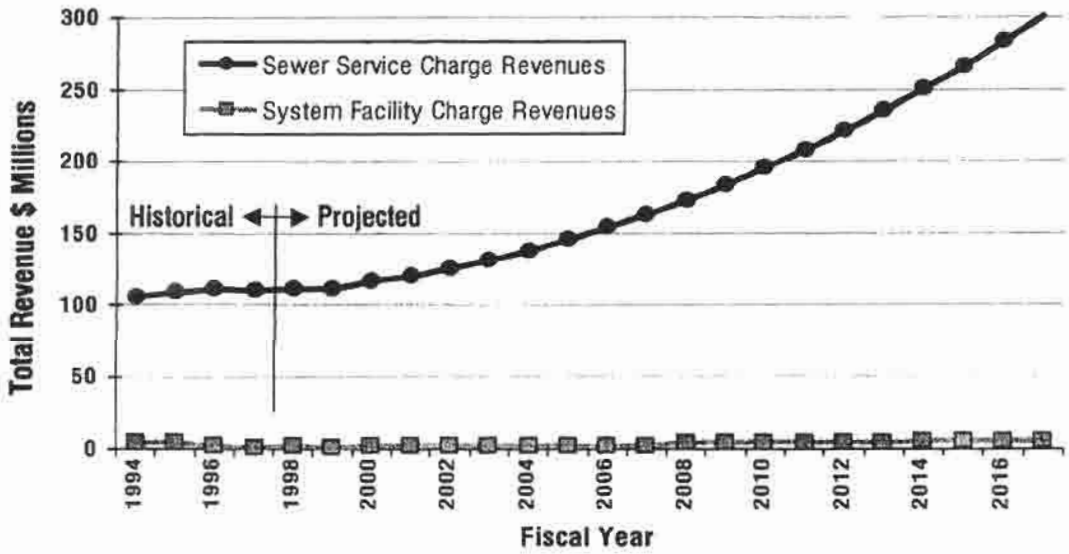


Figure 19
TOTAL REVENUES FROM SEWER SERVICE AND SYSTEM FACILITY CHARGES
CITY AND COUNTY OF HONOLULU

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Chapter 6

SUMMARY OF PROJECTED REVENUES AND EXPENSES

A ten year projection through fiscal year 2006/2007 for the City and County of Honolulu Department of Environmental Services's operations has been prepared and is presented in Table 14. As shown in Table 14, sewer service charges are projected to be the major source of revenues to cover debt service, as has been the case in the past (see Figure 19).

Carollo Engineers has reviewed the assumptions, inputs, and methodologies used by the financial model which has generated these projections, and is of the opinion that the assumptions are reasonable, the rate structure is adequate and competitive, and therefore, projected revenues are adequate to cover operation and maintenance expenses, debt service, required coverage and future capital costs and contingencies.

The principal assumptions underlying these projections follow:

- Growth in ESDUs is 1,500 per year through fiscal year 2006/2007 and 2,500 per year beyond that. The majority of the growth in ESDUs is projected to be residential, as is the current customer base (See Figure 20).
- Capital expenditures are assumed to be required and made as reflected in Table 14 to meet consent decree milestones and accommodate forecasted population growth as projected in the City and County of Honolulu 1992 General Plan.
- Collection system project planning is generally based on a 5-year, 6-hour design storm.
- Interest earnings on fund balances are assumed at 5.0 percent.
- Debt service reserve fund requirements are cash funded from bond proceeds.
- Debt service on the 1998 Senior Bonds and the 1998 Junior Bonds is assumed at an all-in interest cost of 5.00 percent, and the bond payment period of both series is assumed at 30 years. Debt service on all future revenue bonds issues is assumed at an all-in interest cost of 5.50 percent, and the bond repayment period for all future issues is assumed to be 30 years. All future revenue bond issues are assumed to be issued on parity with the 1998 Senior Bonds.
- Bond issuance costs are estimated at 1.0 percent of net bond proceeds.
- Unrestricted reserve balances are maintained at levels indicated in the projections.
- "Required Rate Increases" as identified in Table 14 are assumed to be made by the City Council on a timely basis to produce the incremental revenues projected herein.

Table 14 Projected Cash Flow Summary
City and County of Honolulu Department of Environmental Services

(Revenue and Expense Numbers in Millions)	(FY Ending June 30)										
Fiscal Year	**1998 (7)**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**TOTAL**
Growth Assumptions											
Total ESDUs at Start of Year	275,691	277,351	278,661	280,161	281,661	283,161	284,661	286,161	287,661	289,161	
Total New ESDUs Added	1,660	1,310	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	14,970
Revenues											
Sewer Service Charges	111.5	111.5	116.2	120.3	125.6	131.0	137.8	144.9	153.5	162.6	1,315.0
System Facility Charges (SFC)	1.9	1.5	1.8	1.8	1.9	1.9	2.0	2.1	2.1	2.2	19.1
Interest on Unrestricted Reserves (1)	0.0	2.5	2.8	2.5	2.9	3.0	3.0	2.8	2.5	2.3	24.3
Other Revenues (2)	1.6	0.9	1.0	1.1	1.1	1.2	1.3	1.3	1.4	1.5	12.3
TOTAL REVENUES	115.0	116.4	121.8	125.7	131.5	137.2	144.0	151.1	159.6	168.6	1,370.8
Expenses											
O&M Costs (3)	74.1	68.6	71.5	73.7	76.0	78.3	80.8	83.4	86.0	88.8	781.1
TOTAL EXPENSES	74.1	68.6	71.5	73.7	76.0	78.3	80.8	83.4	86.0	88.8	781.1
TOTAL NET REVENUES	40.9	47.9	50.3	52.0	55.5	58.9	63.2	67.7	73.6	79.8	589.7
Debt Service											
Sr. Revenue Bond Debt Service (4)	0.0	0.0	3.2	5.3	10.1	15.2	20.8	27.0	33.3	39.6	154.6
Jr. Revenue Bond Debt Service (4)(5)	0.0	0.0	10.7	10.2	10.2	10.2	10.2	10.2	10.2	10.2	82.1
Reimbursable G.O. Debt Service (6)	34.3	19.4	12.6	12.5	12.8	13.1	13.0	12.4	11.9	11.6	153.5
SRF Loans (Existing and Future)	4.5	5.1	5.2	5.6	5.9	6.3	6.7	7.0	7.4	7.8	61.4
Total Debt Service	38.8	24.4	31.6	33.6	39.0	44.8	50.7	56.7	62.7	69.1	451.6
TOTAL NET REVENUES AVAILABLE FOR OTHER REQUIREMENTS	2.1	23.5	18.7	18.4	16.5	14.1	12.5	10.9	10.8	10.6	138.1
Sr. Revenue Bond Coverage Ratio (8)	-	-	15.11	9.38	5.33	3.74	2.94	2.43	2.15	1.96	
Total Revenue Bond Coverage Ratio	-	-	3.50	3.22	2.65	2.24	1.97	1.76	1.64	1.56	
Fixed Charge Coverage Ratio:	-	1.90	1.53	1.49	1.38	1.27	1.21	1.16	1.14	1.12	
Capital Project Financing											
Capital Expenditures	37.9	55.1	76.5	75.5	96.5	112.1	114.5	112.5	112.2	109.8	902.5
SRF Loan Proceeds	0.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	45.0
Net Revenue Bond Proceeds	0.0	50.0	30.0	50.0	85.0	85.0	90.0	90.0	90.0	90.0	660.0
Major Reserves (end of year)											
Unrestricted Reserve Balance	42.1	56.8	49.0	58.6	60.1	59.2	55.8	50.8	45.7	40.5	
G.O. Bond Proceeds Fund	47.8	17.1	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Improvement Account Excess/(Shortfall)	-1.7	37.6	18.1	9.6	18.7	12.5	9.5	8.4	7.6	9.1	
Total Ending Balance	88.2	111.5	69.5	68.2	78.8	71.7	65.3	59.2	53.3	49.5	
Projected Charges Required											
Monthly Sewer Service Charge (5)	$33.65	$33.65	$34.66	$35.70	$37.06	$38.46	$40.23	$42.08	$44.36	$46.75	
Increase Over Prior Year	0.0%	0.0%	3.0%	3.0%	3.8%	3.8%	4.6%	4.6%	5.4%	5.4%	
System Facility Charge (5)	$1,146	$1,146	$1,180	$1,216	$1,252	$1,290	$1,329	$1,368	$1,409	$1,452	
Increase Over Prior Year	0.0%	0.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	

notes:
(1) Unrestricted Reserves are all reserves except Revenue Bond Improvement Account and G.O. Bond balance. Interest on G.O. Bond balance remains in City General Fund.
(2) Includes cesspool services, connections, laterals, and other miscellaneous revenues.
(3) Note that FYE 98 O&M expenses include one-time only $3.8 million reimbursement to City General Fund.
(4) Assumes December 1998 issues of Revenue Bonds, with interest payments beginning in FY 99/00.
(5) Junior Series 1998 proceeds used to advance refund approximately $220 million of reimbursable G.O. Bonds.
(6) Debt service on reimbursable G.O. Bonds is paid from the City's General Fund. However, reimbursement to the General Fund is required for these payments from sewer service charges.
(7) Values for FYE 1998 are projected actual, but unaudited.
(8) Revenues for coverage calculations do not include system facility charges.
FYE = Fiscal Year Ending

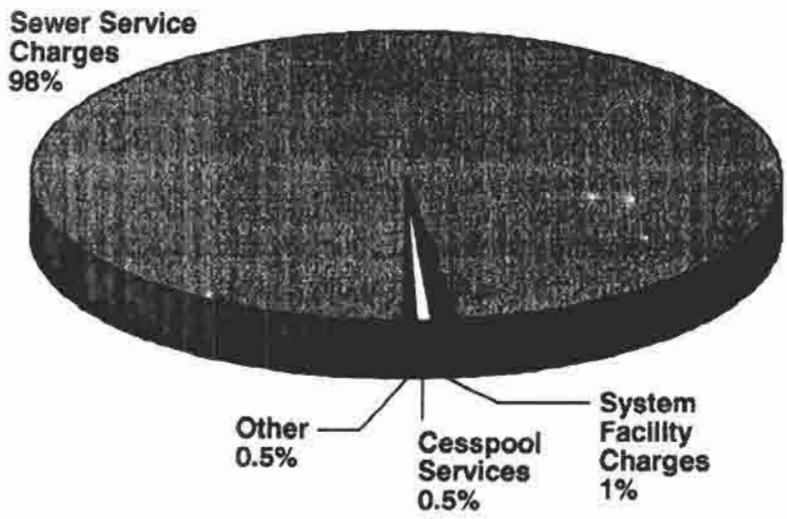

Figure 20
REVENUE SOURCES
FISCAL YEAR 1996-97
CITY AND COUNTY OF HONOLULU

- Inflation of capital expenditures and operations and maintenance (O&M) costs is assumed at 3.0 percent per annum for all categories including labor.

- No increases above inflation of operation and maintenance costs are expected. Any additional facilities will be served at existing or lower staffing levels as discussed in Chapter 2, while maintaining effective facility performance.

- Discharge characteristics from existing customers will not vary significantly from the values identified on the various wastewater facilities plans.

- No catastrophic events resulting from natural or human causes will occur that will have a substantial adverse impact on the integrity of the City and County of Honolulu's wastewater facilities or the activities of their customers.

The City Council has adopted a set of Debt and Financial Policies for its wastewater system that target, among other things, the City to maintain a 1.60 times coverage for its Senior Revenue Bonds and 1.25 times coverage for all Revenue Bonds (Senior and Junior). It is expected that the City will adopt annually increases in sewer services charges necessary to meet the debt service coverage requirements prescribed in its Debt and Financial Policies. Current projections show that the debt service coverage requirements will be achieved by: 1) increasing sewer service charges between 3.0 and 5.4 percent annual beginning in fiscal year ending 1999/2000, and 2) increasing system facility charges 3.0 percent annually beginning in fiscal year ending 1999/2000.

In addition, a sensitivity analysis was performed to determine the impact of low and high growth projections on the required monthly service charges and coverage ratios. The conservative growth rate assumption of 1,500 ESDUs per year (through fiscal year 2007) is less than historical recorded connection rates, particularly when compared to the most recent five-year average of 2,500 ESDUs per year. This conservative growth rate assumption accounts for the recent economic downturn. Should growth increase, several projects may have to be accelerated in the implementation schedule. Because the CIP program will accommodate an additional 20 percent of flow above current levels, while projected ESDU growth assumed for purposes of estimating annual revenues is only 40,000 ESDUs, or 15 percent of the existing number of ESDUs, any additional growth, up to 55,000 ESDUs over the 20-year period, will be accommodated by the planned projects and would only add to estimated revenues. Based on this analysis, the City and County of Honolulu will comply with maintaining its Debt and Financial Policies as stated for the coverage ratio requirements.

CONCLUSIONS

Based upon our studies, the assumptions discussed in this report, and our review of the data and analysis provided by the City and County of Honolulu and its consultants, we conclude the following:

7.1 COMPLIANCE WITH DISCHARGE REQUIREMENTS

Except for periodic events at the State-owned Waimanalo WWTP, the wastewater treatment facilities are meeting current regulatory requirements and are operated and maintained in accordance with standard utility practices.

The City and County of Honolulu's Wastewater System collection and pumping facilities do not meet all of the current and anticipated federal and state regulatory requirements, and will require additional capacity necessary to serve the projected growth in the service area. These collection and pumping facilities constitute much of the need for capital facility improvements.

Completion of the CIP projects described in this report will permit the City and County of Honolulu to attain and to remain in compliance with all federal, state, and local regulations regarding treatment and discharge as described in the current NPDES permit and consent decrees.

7.2 20-YEAR CIP

An estimated $1.4 billion of non-discretionary CIP projects for various treatment, collection and other facilities are required to be constructed over the next 20 years to eliminate the current and projected critical deficiencies, to meet consent decree milestones, and to provide a wastewater system in a satisfactory operating condition based on projected wastewater usage and environmental and other regulatory requirements. The remaining approximately $0.3 billion of CIP projects are discretionary and have been identified to improve wastewater treatment and collection systems. These CIP projects are to be funded from proceeds of bonds, including the 1998 Wastewater Revenue Bonds and from net revenues and other charges.

The $1.7 billion CIP is technically sound and conforms with good engineering practice and the estimated total costs of the CIP have been realistically assessed.

The cost-effectiveness of the wastewater system operations and maintenance activities is anticipated to improve after the CIP projects are accomplished.

7.3 1998-2002 CIP PROJECTS

The projects to be financed by the 1998 Senior Bonds are the highest priority projects required to meet consent decree requirements and protect public health. They are included in recently completed facility plans, which identify the need for projects through the year 2017, and provide the most cost effective facilities evaluated in those plans.

The estimated project costs and construction schedules that have been developed for the 1998-2002 projects are reasonable and achievable.

7.4 DEPARTMENT MANAGEMENT

The operations of the wastewater system are directed by a professional staff for the disciplines of operations specialists, maintenance (including electrical, instrumentation and mechanical), laboratory personnel and other technical support personnel.

7.5 FINANCIAL PROJECTIONS

The financial projections with respect to the wastewater system are based on reasonable and conservative assumptions and should fairly reflect the financial performance of the wastewater system.

Historical, current, and projected customer rates and charges for the City and County of Honolulu are relatively high compared to the rates and charges of other agencies, but are reasonable considering a number of site specific factors.

In the opinion of Carollo Engineers, projected sewer service and system facility charges will provide revenue sufficient to:

- Meet all projected costs of operation, maintenance and routine replacement of sewer system facilities.
- Meet the existing debt service obligations and the projected requirements for the 1998 Senior Bonds, the 1998 Junior Bonds, and future bond issues.
- Provide sufficient revenue to pay the costs of the City and County of Honolulu's CIP through the end of the forecast period.
- Meet reserve requirements of bond resolution.

The funds obtained from the sale of the 1998 Senior Bonds, current cash reserves, fees collected over the next few years, and future bond issues will be adequate to fund the current projects. The funds obtained from the sale of the 1998 Junior Bonds will be used to refund certain reimbursable General Obligation bonds of the City and County issued to finance previously identified projects for the wastewater system.

The rate at which growth occurs will not affect the ability of the City and County of Honolulu to meet its debt obligations because the growth is a small component of the overall costs and revenues associated with the financial projections. In general, many of the CIP projects are necessary and must proceed based on consent decree requirements and public safety and health concerns with or without any additional connections.

This report has been prepared at the request of the City and County of Honolulu for appending to the Official Statements relating to the issuance of the 1998 Senior Bonds and the 1998 Junior Bonds. The conclusions, observations, and recommendations contained herein constitute only the opinions of Carollo Engineers. The various background documents, statements and other information supplied by the City and County of Honolulu, its employees, and other consultants have been relied upon as being accurate in the performance of these analyses. However, no assurances are given nor warranties implied by Carollo as to the accuracy of such information. Carollo makes no certification and gives no assurances except as explicitly set forth in this report.

ADAF	average day annual flow
ADWF	average day dry weather flow
BOD_5	five-day biochemical oxygen demand
CIP	Capital Improvement Plan
DOH	Department of Health
DWR	Department of Water Resources
ENRCCI	ENR Construction Cost Index
EPA	Environmental Protection Agency
ESDU	equivalent single-family dwelling unit
ft	feet
FY	fiscal year
FYE	fiscal year ending
gal	gallons
GO Bonds	General Obligation Bonds
gpd	gallons per day
gpm	gallons per minute
mgd	million gallons per day
mg/l	milligrams per liter
NPDES	National Pollutant Discharge Elimination System
O&M	operations and maintenance
PHWWF	peak hour wet weather flow
PWWF	peak wet weather flow
SEP	supplemental environmental projects
SFR	single-family residence
TSS	total suspended solids
WWTP	wastewater treatment plant
WWPTF	wastewater pre-treatment facility

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PROPOSED FORM OF CONTINUING DISCLOSURE CERTIFICATE

MASTER CERTIFICATE OF THE DIRECTOR OF BUDGET AND FISCAL SERVICES OF THE CITY AND COUNTY OF HONOLULU, HAWAII, PROVIDING FOR CONTINUING DISCLOSURE

I, the undersigned, Roy K. Amemiya, Jr., being the duly appointed Director of Budget and Fiscal Services (the "Director") of the City and County of Honolulu, Hawaii (the "City and County", DO HEREBY CERTIFY as follows:

ARTICLE I
PURPOSE AND DEFINITIONS

Section 1.1. *Purpose.* This Certificate shall constitute a written undertaking for the benefit of the Holders of the Bonds, and is being executed and delivered solely to assist the Underwriters in complying with subsection (b)(5) of the Rule.

Section 1.2. *Definitions.* The following terms used in this Certificate shall have the following respective meanings:

"Annual Financial Information" means, collectively, (i) the financial information and operating data with respect to the Department for each fiscal year of the Department of the type included in the Series 1998 Official Statement of the City and County under the headings "FINANCIAL STATEMENTS," and "PENDING LITIGATION;" and (ii) the information regarding amendments to this Certificate required pursuant to Sections 3.2(c) and (d) of this Certificate. Audited Financial Statements, if available, or Unaudited Financial Statements shall be included in the Annual Financial Information as described in Section 2.1(c) of this Certificate.

The descriptions contained in clause (i) above of financial information and operating data constituting Annual Financial Information are of general categories of financial information and operating data. When such descriptions include information that no longer can be generated because the operations to which it related have been materially changed or discontinued, a statement to that effect shall be provided in lieu of such information.

"Audited Financial Statements" means the annual financial statements, if any, of the Department, audited by such auditor as shall then be required or permitted by State law or the Charter of the City and County. Audited Financial Statements shall be prepared in accordance with GAAP; *provided, however,* that the Department may from time to time, if required by federal or State legal requirements, modify the accounting principles to be followed in preparing its financial statements. The notice of any such modification required by Section 3.2(d) of this Certificate shall include a reference to the specific federal or State law or regulation describing such accounting principles. Prior to the fiscal year ending June 30, 1999, Audited Financial Statements of the Department means the extracts of the audited financial statements of the City and County relating to the Sewer Fund and the Wastewater System Facility Charge Fund.

"Beneficial Owner" means any person who (i) has the power, directly or indirectly, to vote or consent with respect to, or dispose of ownership of, any Bonds (including a person who holds Bonds through a nominee, depository or other intermediary), or (ii) is treated as the owner of any Bonds for federal income tax purposes.

"Bonds" means any revenue bonds issued by the City and County under and pursuant to Resolution No. 98-193 duly adopted by the City Council of the City and County on November 10, 1998 and identified in a Series Certificate.

"Counsel" means Hawkins, Delafield & Wood or other nationally recognized bond counsel or counsel expert in federal securities laws.

"Department" means the Department of Environmental Services of the City and County.

"Director" means any duly appointed Director of Budget and Fiscal Services of the City and County.

"GAAP" means generally accepted accounting principles as prescribed from time to time for governmental units by the Governmental Accounting Standards Board.

"Holder" means any person who shall be the registered owner, or his duly authorized attorney-in-fact, representative or assign, of any Bond.

"Material Event" means any of the following events with respect to the Bonds, whether relating to the Department or otherwise, if material:

(1) principal and interest payment delinquencies;
(2) non-payment related defaults;
(3) unscheduled draws on debt service reserves reflecting financial difficulties;
(4) unscheduled draws on credit enhancements reflecting financial difficulties;
(5) substitution of credit or liquidity providers, or their failure to perform;
(6) adverse tax opinions or events affecting the tax-exempt status of the security;
(7) modifications to rights of security holders;
(8) bond calls;
(9) defeasances;
(10) release, substitution, or sale of property securing repayment of the securities; and
(11) rating changes.

"Material Event Notice" means notice of a Material Event.

"MSRB" means the Municipal Securities Rulemaking Board established pursuant to Section 15B(b)(1) of the Securities Exchange Act of 1934.

"NRMSIR" means, at any time, a then-existing nationally recognized municipal securities information repository, as recognized from time to time by the SEC for the purposes referred to in the Rule. The NRMSIRs as of the date of this Certificate are Bloomberg L.P. (Princeton, NJ), Disclosure, Inc. (Bethesda, MD), Kenny Information Systems (New York, NY), Moody's Investors Service (New York, NY), and Thomson Municipal Services Inc. (New York, NY). Filing information relating to such NRMSIRs is set forth in Exhibit A hereto.

"Official Statement" means the "final official statement," as defined in paragraph (f)(3) of the Rule.

"Rule" means Rule 15c2-12 promulgated by the SEC under the Securities Exchange Act of 1934 (17 CFR Part 240, §240.15c2-12), as in effect on the date of this Certificate, including any official interpretations thereof issued either before or after the effective date of this Certificate which are applicable to this Certificate.

"SEC" means the United States Securities and Exchange Commission.

"Series Certificate" means any certificate executed by the Director as described in Section 3.3 of this Certificate extending the benefits of this Certificate to the Beneficial Owners, Holders and Underwriters of Bonds of a Series.

"Series 1998 Official Statement" means the Official Statement of the City and County relating to its Wastewater System Revenue Bonds (First Bond Resolution), Senior Series 1998.

"SID" means, at any time, a then-existing state information depository, if any, as operated or designated as such by or on behalf of the State for the purposes referred to in the Rule. As of the date of this Certificate, there is no SID.

"State" means the State of Hawaii.

"Supplemental Certificate" means any certificate executed by the Director as described in Section 3.2 of this Certificate amending the provisions of this Certificate.

"Unaudited Financial Statements" means the same as Audited Financial Statements, except that they shall not have been audited.

"Underwriter" means any original underwriter of a Series of Bonds who is required to comply with the Rule and who is identified in a Series Certificate.

ARTICLE II

THE UNDERTAKING

Section 2.1. *Annual Financial Information.* (a) The City and County shall provide Annual Financial Information with respect to each fiscal year of the Department, commencing with the fiscal year ending June 30, 1998, by no later than eight months after the end of the respective fiscal year, to each NRMSIR and the SID. The City and County may provide Annual Financial Information by specific reference to documents (i) either (1) provided to each NRMSIR existing at the time of such reference and the SID or (2) filed with the SEC, or (ii) if such document is an Official Statement, available from the MSRB. The Department may provide Annual Financial Information in one document or multiple documents comprising a package, and at one time or in part from time to time.

(b) The City and County shall provide, in a timely manner, notice of any failure of the City and County to provide the Annual Financial Information by the date specified in subsection (a) above to (i) either the MSRB or each NRMSIR, and (ii) the SID.

(c) If Audited Financial Statements are not provided as part of Annual Financial Information by the date required by Section 2.1(a) of this Certificate, the City and County shall provide (i) as part of the Annual Financial Information, Unaudited Financial Statements in a format similar to the unaudited financial statements contained in the Series 1998 Official Statement under the heading "FINANCIAL STATEMENTS," and (ii) Audited Financial Statements, when and if available, to each NRMSIR and the SID.

(d) The Department's current fiscal year is July 1 of a calendar year to June 30 of the succeeding calendar year. The City and County promptly notify (i) each NRMSIR, and (ii) the SID of each change in its fiscal year.

Section 2.2. *Material Event Notices.* (a) If a Material Event occurs, the City and County shall provide, in a timely manner, a Material Event Notice to (i) either the MSRB or each NRMSIR, and (ii) the SID.

(b) Upon any legal defeasance of any Bonds of a Series, the City and County shall provide notice of such defeasance to (i) each NRMSIR or the MSRB and (ii) the SID, which notice shall state whether such Bonds have been defeased to maturity or to redemption and the timing of such maturity or redemption.

(c) Each Material Event Notice shall be so captioned and shall prominently state the title, date and CUSIP numbers of the Bonds.

Section 2.3. *Additional Disclosure Obligations.* The City and County acknowledges and understands that other state and federal laws, including but not limited to the Securities Act of 1933 and Rule 10b-5 promulgated under the Securities Exchange Act of 1934, may apply to the Department, and that under some circumstances compliance with this Certificate, without additional disclosures or other action, may not fully discharge all duties and obligations of the Department under such laws.

Section 2.4. *Additional Information.* Nothing in this Certificate shall be deemed to prevent the City and County from disseminating any other information, using the means of dissemination set forth in this Certificate or any other means of communication, or including any other information in any Annual Financial Information or Material Event Notice, in addition to that which is required by this Certificate. If the City and County chooses to include any information in any Annual Financial Information or Material Event Notice in addition to that which is specifically required by this Certificate, the City and County shall have no obligation under this Certificate to update such information or include it in any future Annual Financial Information or Material Event Notice.

Section 2.5. *No Previous Non-Compliance.* The City and County represents that since July 3, 1995, it has not failed to comply in any material respect with any previous undertaking in a written contract or agreement specified in paragraph (b)(5)(i) of the Rule.

Section 2.6. *Transmission of Information and Notices.* Unless otherwise required by law and, in the City and County's sole determination, subject to technical and economic feasibility, the City and County shall employ such methods of information and notice transmission as shall be requested or recommended by the herein-designated recipients of the Department's information and notices.

ARTICLE III

TERMINATION, AMENDMENT, ENFORCEMENT, BENEFICIARIES AND DISSEMINATION AGENT

Section 3.1. *Termination.* (a) The City and County's obligations under this Certificate with respect to the Bonds shall terminate upon (i) a prior redemption or payment in full of all of the Bonds of such Series, or (ii) a legal defeasance of all of the Bonds of such Series.

(b) This Certificate, or any provision of this Certificate, shall be null and void in the event that there is delivered (i) to Director an opinion of Counsel, addressed to the City and County, to the effect that those portions of the Rule which require this Certificate, or any of the provisions of this Certificate, respectively, do not or no longer apply to the Bonds, whether because such portions of the Rule are invalid, have been repealed, or otherwise, as shall be specified in such opinion, and (2) copies of such opinion to each NRMSIR and the SID.

Section 3.2. *Amendment.* (a) This Certificate may be amended by a Supplemental Certificate of the Director, without the consent of the Holders of the Bonds, if all of the following conditions are satisfied:

(1) such amendment is made in connection with a change in circumstances that arises from a change in legal (including regulatory) requirements, a change in law (including rules or regulations) or in interpretations thereof, or a change in the identity, nature or status of the Department or the type of business conducted thereby;

(2) this Certificate as so amended would have complied with the requirements of the Rule as of the date of this Certificate, after taking into account any amendments or interpretations of the Rule, as well as any change in circumstances;

(3) there shall have been delivered to the Director, an opinion of Counsel, addressed to the City and County, to the same effect as set forth in clause (2) above;

(4) there shall have been delivered to the Director, an opinion of Counsel or a determination by a person, in each case unaffiliated with the City and County (such as bond counsel) and acceptable to the City and County, addressed to the City and County, to the effect that the amendment does not materially impair the interests of the Holders of the Bonds; and

(5) the City and County shall have delivered copies of such opinion(s) and amendment to each NRMSIR and the SID.

(b) In addition to subsection (a) above, this Certificate may be amended and any provision of this Certificate may be waived by a Supplemental Certificate of the Director, without the consent of the holders of the Bonds, if all of the following conditions are satisfied: (1) an amendment to the Rule is adopted, or a new or modified official interpretation of the Rule is issued, after the effective date of this Certificate which is applicable to this Certificate, (2) there shall have been delivered to the Director an opinion of Counsel, addressed to the City and County, to the effect that performance by the City and County under this Certificate as so amended or giving effect to such waiver, as the case may be, will not result in a violation of the Rule as amended or officially interpreted and (3) the City and County shall have delivered copies of such opinion and amendment to each NRMSIR and the SID.

(c) To the extent any amendment to this Certificate results in a change in the type of financial information or operating data provided pursuant to this Certificate, the first Annual Financial Information provided thereafter shall include a narrative explanation of the reasons for the amendment and the impact of the change.

(d) If an amendment is made to the accounting principles to be followed in preparing financial statements, the Annual Financial Information for the year in which the change is made shall present a comparison between the financial statements or information prepared on the basis of the new accounting principles and those prepared on the basis of the former accounting principles. Such comparison shall include a qualitative and, to the extent reasonably feasible, quantitative discussion of the differences in the accounting principles and the impact of the change in the accounting principles on the presentation of the financial information. Notice of such amendment shall be provided by the City and County to (i) either the MSRB or each NRMSIR and (ii) the SID.

Section 3.3. *Benefit; Third-Party Beneficiaries; Enforcement.* (a) By execution of a Series Certificate identifying the Underwriters and the Bonds of a Series, the provisions of this Certificate shall inure solely to the benefit of such Underwriters and the Holders from time to time of such Bonds. Beneficial Owners of such Bonds shall be third-party beneficiaries of this Certificate.

(b) Except as provided in this subsection (b), the provisions of this Certificate shall create no rights in any person or entity. The obligations of the City and County to comply with the provisions of this Certificate shall be enforceable by any Holder of outstanding Bonds; *provided, however,* that such right to enforce the provisions of this Certificate shall be limited solely to a right, by action in mandamus or for specific performance, to compel performance of the City and County's obligations under this Certificate. In consideration of the third-party beneficiary status of Beneficial Owners of Bonds pursuant to subsection (a) of this Section, Beneficial Owners shall be deemed to be Holders of Bonds for purposes of this subsection (b).

(c) Any failure by the City and County to perform in accordance with this Certificate shall not constitute a default under any ordinance or resolution of the City and County authorizing the Bonds of any Series or any certificate of the Director providing for the issuance of the Bond of a Series.

(d) This Certificate shall be construed and interpreted in accordance with the laws of the State, and any suits and actions arising out of this Certificate shall be instituted in a court of competent jurisdiction in the State; *provided, however,* that to the extent this Certificate addresses matters of federal securities laws, including the Rule, this Certificate shall be construed in accordance with such federal securities laws and official interpretations thereof.

Section 3.4. *Dissemination Agent.* The Director, on behalf of the Department, shall disseminate the Annual Financial Information, the Audited Financial Statements, the Unaudited Financial Statements, the Material Event Notices and all other information and notices as described in this Certificate. The Director may appoint one or more agents to disseminate such information and notices.

Dated this 23rd day of December, 1998.

_____
Roy K. Amemiya, Jr.,
Director of Budget and Fiscal Services
City and County of Honolulu, Hawaii

The above and foregoing certificate is
hereby approved as to form and legality
this 23rd day of December, 1998.

_____
Corporation Counsel
City and County of Honolulu, Hawaii

EXHIBIT A
to Continuing Disclosure Certificate

Filing information relating to the Nationally Recognized Municipal Securities Information Repositories approved by the Securities and Exchange Commission (subject to change):

Bloomberg Municipal Repositories
P.O. Box 840
Princeton, NJ 08542-0840
or
100 Business Park Drive
Skillman, NJ 08558
Internet address: munis@bloomberg.com
Telephone: (609) 279-3200
Fax: (609) 279-5962

Kenny Information Systems, Inc.
Attn: Kenny Repository Service
65 Broadway, 16th Floor
New York, New York 10006
Telephone: (212) 770-4595
Fax: (212) 797-7994

DPC Data Inc.
One Executive Drive
Fort Lee, NJ 07024
Internet address: nrmsir@dpcdata.com
Telephone: (201) 346-0701
Fax: (201) 947-0107

Thomson NRMSIR
Attn: Municipal Disclosure
395 Hudson Street, 3rd Floor
New York, New York 10014
Internet address: disclosure@muller.com
Telephone: (212) 807-5001 or (800) 689-8466
Fax: (212) 989-2078

SERIES CERTIFICATE OF THE DIRECTOR OF BUDGET AND FISCAL SERVICES OF THE CITY AND COUNTY OF HONOLULU, HAWAII, PROVIDING FOR CONTINUING DISCLOSURE

I, the undersigned, Roy K. Amemiya, Jr., being the duly appointed Director of Budget and Fiscal Services (the "Director") of the of the City and County of Honolulu, Hawaii (the "City and County"), DO HEREBY CERTIFY that: (i) this Certificate is a Series Certificate as defined in Section 1.1 and described in Section 3.3 of the Master Certificate of the Director of Budget and Fiscal Services of the City and County of Honolulu, Hawaii, Providing for Continuing Disclosure, dated December 23, 1998 (the "Master Certificate"); (ii) PaineWebber Incorporated and Salomon Smith Barney as the Underwriters of the $55,300,000 Wastewater System Revenue Bonds (First Bond Resolution), Senior Series 1998 of the City and County, dated December 1, 1998 (the "Series 1998 Bonds"), shall be beneficiaries of the Master Certificate; (iii) the Holders of the Series 1998 Bonds shall also be beneficiaries of the Master Certificate; (iv) the Beneficial Owners of Series 1998 Bonds shall be third-party beneficiaries of the Master Certificate; and (v) all capitalized terms used herein shall have the respective meanings as defined in the Master Certificate.

Dated this 23rd day of December, 1998.

Roy K. Amemiya, Jr.,
Director of Budget and Fiscal Services
City and County of Honolulu, Hawaii

The above and foregoing certificate is
hereby approved as to form and legality
this 23rd day of December, 1998.

Corporation Counsel
City and County of Honolulu, Hawaii

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PROPOSED FORM OF OPINION OF BOND COUNSEL

City Council
City and County of Honolulu
Honolulu, Hawaii

Members of the City Council:

CITY AND COUNTY OF HONOLULU, HAWAII
WASTEWATER REVENUE SYSTEM BONDS,
(FIRST BOND RESOLUTION)
SENIOR SERIES 1998, $55,300,000

At your request, we have examined into the validity of $55,300,000 principal amount of City and County of Honolulu, Hawaii, Wastewater System Revenue Bonds (First Bond Resolution), Senior Series 1998 (the "Bonds"). The Bonds are dated December 1, 1998, are issuable in the denomination of $5,000 or any integral multiple of $5,000, and mature on July 1 in each of the years and in the respective principal amounts set forth below, with the Bonds maturing in a particular year bearing interest payable on July 1, 1999 and semiannually on January 1 and July 1 of each year thereafter, in each case to registered holders of record as of the close of business on the fifteenth day (whether or not a business day) of the month next preceding an interest payment date, at the rate per annum set opposite such year, as follows:

Maturity Date	Principal Amount	Interest Rate	Maturity Date	Principal Amount	Interest Rate
2001	$1,010,000	4.000%	2008	$ 1,335,000	4.125%
2002	1,050,000	4.000	2009	1,400,000	5.000
2003	1,095,000	4.000	2010	1,470,000	5.000
2004	1,140,000	4.000	2011	1,545,000	5.000
2005	1,185,000	4.000	2012	1,625,000	5.000
2006	1,235,000	4.000	2018	11,565,000	4.750
2007	1,285,000	4.000	2028	28,360,000	4.750

The Bonds are subject to optional and mandatory redemption upon the terms and conditions and at the prices set forth therein. The Bonds are transferable and exchangeable upon the terms and conditions set forth therein. The Bonds recite that they have been authorized and issued under, pursuant to and in full compliance with the Constitution and statutes of the State of Hawaii, including particularly Chapter 49, Hawaii Revised Statutes, the Charter of the City and County, a First Wastewater System Revenue Bond Resolution duly adopted by the City Council of the City and County on November 10, 1998 and a Series Resolution duly adopted by the City Council of the City and County on November 10, 1998 (collectively, the "Resolution"), and a Series Certificate dated as of December 23, 1998, and that the Bonds are part of an issue of bonds to be issued for any lawful use and purpose relating to the Wastewater System, owned by and controlled by the City and County, including payment of the costs of any Improvements (as such terms are defined in the Resolution).

We have examined the Constitution and statutes of the State of Hawaii, the Charter of the City and County, certified proceedings of the City and County authorizing the issuance of the Bonds, including the Resolution, such other proceedings and documents as we have considered necessary or advisable, and a specimen Bond.

In our opinion:

1. The Bonds have been duly authorized and issued in accordance with the Constitution and statutes of the State of Hawaii and the Charter of the City and County, and constitute valid and legally binding limited special obligations of the City and County payable solely from and secured by a pledge of proceeds of bonds issued under and pursuant to the Resolution which are held or set aside under the Resolution, the Net Revenues (as such term is defined in the Resolution), and certain funds and accounts held under the Resolution, and are payable and secured equally and ratably with other bonds issued under and pursuant to the Resolution except to the extent permitted

under the Resolution. The pledge of the Net Revenues made by the Resolution is senior and superior to the pledge made by any other resolution which may be adopted by the City Council of the City and County.

2. The Resolution has been duly adopted by the City Council of the City and County and the provisions thereof are valid and binding on the City and County and the holders of the Bonds are entitled to the security and benefits of the Resolution.

3. Under the existing laws of the State of Hawaii, the Bonds and the income therefrom are exempt from taxation by the State of Hawaii under Chapter 235, Hawaii Revised Statutes (Hawaii Income Tax Law) or any county or any political subdivision thereof, except inheritance, transfer and estate taxes and except to the extent such income may be included in the measure of the franchise tax imposed on banks and other financial corporations pursuant to the laws of the State of Hawaii.

4. Assuming compliance by the City and County with the tax covenants made in the proceedings authorizing the Bonds, (i) under existing statutes and court decisions, interest on the Bonds is not included in gross income for Federal income tax purposes pursuant to Section 103 of the Internal Revenue Code of 1986, as amended (the "Code"), and (ii) under the Code, interest on the Bonds is not treated as a preference item in calculating alternative minimum taxable income for purposes of the alternative minimum tax applicable to individuals and corporations; such interest, however, is includable in the adjusted current earnings of certain corporations for purposes of computing the alternative minimum tax imposed on corporations by the Code.

It is to be understood that the rights of the holders of the Bonds under the Bonds and under the Resolution and the enforceability thereof may be subject to the valid exercise of judicial discretion, the sovereign police powers of the State of Hawaii and the constitutional powers of the United States of America, and valid bankruptcy, insolvency, reorganization, moratorium and other laws affecting creditors' rights.

It is to be further understood that exclusion of the interest on the Bonds from gross income for federal income tax purposes is dependent upon continuing compliance by the City and County with certain requirements of the Code, throughout the term of the Bonds. Under the Code, failure to comply with such requirements may cause the interest on the Bonds to be included in gross income retroactively to their date of issuance. The City and County has covenanted to comply with such requirements of the Code.

We express no opinion regarding federal, state or local tax consequences arising with respect to the Bonds except as stated above.

Very truly yours,

/s/ Hawkins, Delafield & Wood

Appendix E

Financial Guaranty Insurance
Company
115 Broadway
New York, NY 10006
(212) 312-3000
(800) 352-0001

A GE Capital Company

Municipal Bond
New Issue Insurance Policy

Issuer:	**Policy Number:**
	Control Number: 0010001
Bonds:	**Premium:**

Financial Guaranty Insurance Company ("Financial Guaranty"), a New York stock insurance company, in consideration of the payment of the premium and subject to the terms of this Policy, hereby unconditionally and irrevocably agrees to pay to State Street Bank and Trust Company, N.A., or its successor, as its agent (the "Fiscal Agent"), for the benefit of Bondholders, that portion of the principal and interest on the above-described debt obligations (the "Bonds") which shall become Due for Payment but shall be unpaid by reason of Nonpayment by the Issuer.

Financial Guaranty will make such payments to the Fiscal Agent on the date such principal or interest becomes Due for Payment or on the Business Day next following the day on which Financial Guaranty shall have received Notice of Nonpayment, whichever is later. The Fiscal Agent will disburse to the Bondholder the face amount of principal and interest which is then Due for Payment but is unpaid by reason of Nonpayment by the Issuer but only upon receipt by the Fiscal Agent, in form reasonably satisfactory to it, of (i) evidence of the Bondholder's right to receive payment of the principal or interest Due for Payment and (ii) evidence, including any appropriate instruments of assignment, that all of the Bondholder's rights to payment of such principal or interest Due for Payment shall thereupon vest in Financial Guaranty. Upon such disbursement, Financial Guaranty shall become the owner of the Bond, appurtenant coupon or right to payment of principal or interest on such Bond and shall be fully subrogated to all of the Bondholder's rights thereunder, including the Bondholder's right to payment thereof.

This Policy is non-cancellable for any reason. The premium on this Policy is not refundable for any reason, including the payment of the Bonds prior to their maturity. This Policy does not insure against loss of any prepayment premium which may at any time be payable with respect to any Bond.

As used herein, the term "Bondholder" means, as to a particular Bond, the person other than the Issuer who, at the time of Nonpayment, is entitled under the terms of such Bond to payment thereof. "Due for Payment" means, when referring to the principal of a Bond, the stated maturity date thereof or the date on which the same shall have been duly called for mandatory sinking fund redemption and does not refer to any earlier date on which payment is due by reason of call for redemption (other than by mandatory sinking fund redemption), acceleration or other advancement of maturity and means, when referring to interest on a Bond, the stated date

Financial Guaranty Insurance
Company
115 Broadway
New York, NY 10006
(212) 312-3000
(800) 352-0001

A GE Capital Company

FGIC

Municipal Bond
New Issue Insurance Policy

for payment of interest. "Nonpayment" in respect of a Bond means the failure of the Issuer to have provided sufficient funds to the paying agent for payment in full of all principal and interest Due for Payment on such Bond. "Notice" means telephonic or telegraphic notice, subsequently confirmed in writing, or written notice by registered or certified mail. from a Bondholder or a paying agent for the Bonds to Financial Guaranty. "Business Day" means any day other than a Saturday, Sunday or a day on which the Fiscal Agent is authorized by law to remain closed.

In Witness Whereof, Financial Guaranty has caused this Policy to be affixed with its corporate seal and to be signed by its duly authorized officer in facsimile to become effective and binding upon Financial Guaranty by virtue of the countersignature of its duly authorized representative.

President

Effective Date: **Authorized Representative**

State Street Bank and Trust Company, N.A., acknowledges that it has agreed to perform the duties of Fiscal Agent under this Policy.

Authorized Officer

Financial Guaranty Insurance
Company
115 Broadway
New York, NY 10006
(212) 312-3000
(800) 352-0001

A GE Capital Company

FGIC

Endorsement
To Financial Guaranty Insurance Company Insurance Policy

Policy Number: **Control Number:** 0010001

It is further understood that the term "Nonpayment" in respect of a Bond includes any payment of principal or interest made to a Bondholder by or on behalf of the issuer of such Bond which has been recovered from such Bondholder pursuant to the United States Bankruptcy Code by a trustee in bankruptcy in accordance with a final, nonappealable order of a court having competent jurisdiction.

NOTHING HEREIN SHALL BE CONSTRUED TO WAIVE, ALTER, REDUCE OR AMEND COVERAGE IN ANY OTHER SECTION OF THE POLICY. IF FOUND CONTRARY TO THE POLICY LANGUAGE, THE TERMS OF THIS ENDORSEMENT SUPERSEDE THE POLICY LANGUAGE.

In Witness Whereof, Financial Guaranty has caused this Endorsement to be affixed with its corporate seal and to be signed by its duly authorized officer in facsimile to become effective and binding upon Financial Guaranty by virtue of the countersignature of its duly authorized representative.

President

Effective Date: **Authorized Representative**

Acknowledged as of the Effective Date written above:

Authorized Officer
State Street Bank and Trust Company, N.A., as Fiscal Agent

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